INSTRUCTIONS FOR USE

COMPONEDEX FAKERSCOPE 2500

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1.0 INTRODUCTION

The FAKERSCOPE 2500 has been designed to provide you with a Data line analyser, message generator, bit error rate tester and breakout box in one portable package. The unit can be used to perform a variety of communications and terminal tests, and has been specifically designed to be as simple as possible to use.

GENERAL

Using a system of non-volatile setup menu files and simple 'operational status' displays, the FAKERSCOPE 2500 has been designed to enable the user, with a minimum of setting up, to capture data or generate a pre-programmed message.

All setup parameters are contained within one setup menu which covers speed, format and sync/async operation, etc. The Fakerscope 2500 contains ten such setup files, any one of which can be selected and loaded very quickly, allowing for very fast reconfiguration between one set of operational parameters and another. An edit facility is accessed from the setup menu for operator input of message and trigger strings, sync bytes and menu titles.

When in operational mode one of three status displays can be selected to provide the user with all the operating parameters of the Fakerscope 2500 "at a glance", and allows alteration of any parameter within seconds.

The unit is powered by internal re-chargeable batteries which can power the Fakerscope away from a mains supply for three hours. A mains adaptor is provided which will simultaneously charge the batteries and power the Fakerscope. The Fakerscope is supplied with an adaptor lead allowing battery charging from a car lighter socket.

CAPTURE AND DISPLAY

In Monitor mode real time data may be displayed on the 80 character data display. Transmit and receive data are simultaneously displayed respectively on the top and bottom line of the LCD panel. Data may be displayed in one of either ASCII, EBCDIC, EBCD, BAUDOT, IPARS, or HEX code. The format is selectable and may be alternated whilst data is being displayed. Data control codes are displayed as symbols.

Associated with the data display is an 8Kb data capture buffer. This buffer may be used to capture and store line data, which can be reviewed on the LCD panel or printed at a later date. The capture buffer may be set to acquire data continuously or can acquire data, stopping when the buffer is full. Alternatively data acquisition can be controlled by the user trigger.

The trigger may be DTR or one of ten user input data strings up to 32 characters long. The trigger is used to stop the capture buffer at a pre-determined point when a particular line event occurs. The trigger point may be selected to fall at the beginning, mid or end point of the capture buffer. The trigger may be selected as "off" by the user. The current status and settings of the trigger function are shown in the 'monitor status' display.

MESSAGE GENERATOR

The Fakerscope 2500 message generator is able to generate an ASCII, EBCDIC, BAUDOT, EBCD, IPARS, or CORRESPONDENCE "fox" message or one of ten user input messages. The user message buffers are 256 bytes long. The message buffer editor allows a message of any length up to the maximum to be entered. It is possible to join two message buffers to allow messages up to 512 characters to be generated. A message may be transmitted continuously, once or one character at a time. The message generator can be automatically triggered by the user trigger string of up to 32 characters.

Output data is selectable to be transmitted on pin 2 or 3 of the breakout panel. The message generator can work in full or half duplex. Operation of the message generator is independent of the capture buffer and data display, which may be selected to review the message generator data if required.

A 'copy' utility is provided in the setup menu which will allow copying of data between capture buffers, user message buffers and trigger buffers. This facility can be used to effectively 'down line load' user message and trigger strings.

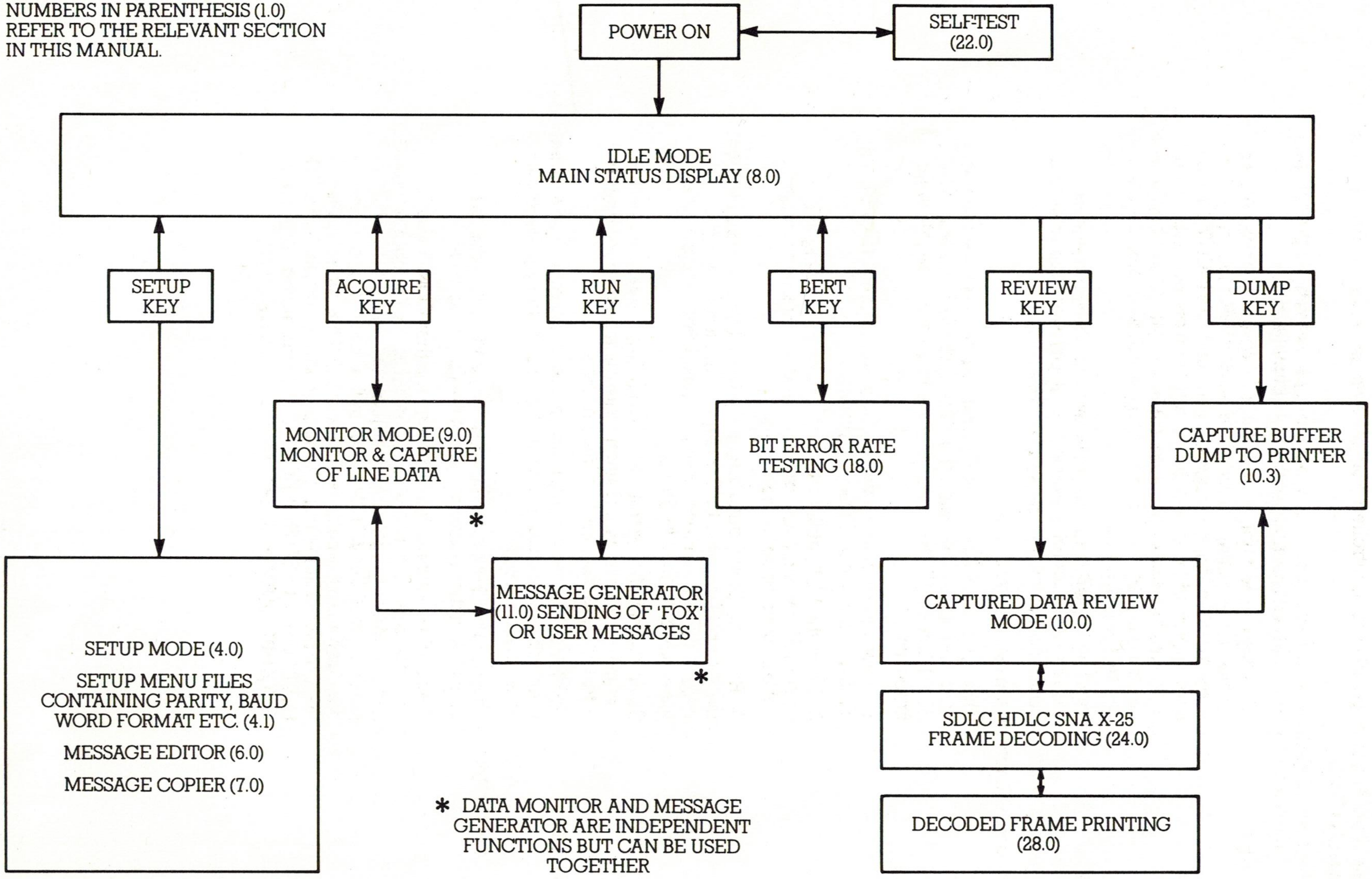
CENTRONICS PORT

The message generator may be used to output the fox or user programmed message via the built-in centronics port.

A 'capture buffer dump' utility is provided which will dump the entire contents of the capture buffer via the centronics port. The data for both transmit and receive is dumped in hex together with a decode in ASCII, EBCDIC, BAUDOT, EBCD or IPARS.

BREAKOUT PANEL

As a further aid in practical fault finding the Fakerscope 2500 is fitted with a comprehensive breakout panel, featuring a custom LCD display which continuously displays the state of the sixteen most commonly used RS232 pins, together with a breakout and patch field. Associated with the patch field is an LCD monitor for negative RS232 levels, a patchable spare RS232 monitor and a "pulse catch monitor".
Level generators are provided for positive and negative RS232 levels.


POWER ON
SELF-TEST (22.0)
IDLE MODE
MAIN STATUS DISPLAY (8.0)
SETUP KEY
ACQUIRE KEY
RUN KEY
BERT KEY
REVIEW KEY
DUMP KEY
MONITOR MODE (9.0) MONITOR & CAPTURE OF LINE DATA *
BIT ERROR RATE TESTING (18.0)
CAPTURE BUFFER DUMP TO PRINTER (10.3)
SETUP MODE (4.0)
SETUP MENU FILES CONTAINING PARITY, BAUD WORD FORMAT ETC. (4.1)
MESSAGE EDITOR (6.0)
MESSAGE COPIER (7.0)
MESSAGE GENERATOR (11.0) SENDING OF 'FOX' OR USER MESSAGES *
CAPTURED DATA REVIEW MODE (10.0)
SDLC HDLC SNA X-25 FRAME DECODING (24.0)
DECODED FRAME PRINTING (28.0)

NUMBERS IN PARENTHESIS (1.0) REFER TO THE RELEVANT SECTION IN THIS MANUAL.

* DATA MONITOR AND MESSAGE GENERATOR ARE INDEPENDENT FUNCTIONS BUT CAN BE USED TOGETHER

FIG. 1 FAKERSCOPE 2500 OPERATIONAL OVERVIEW

2.0 FAKERSCOPE 2500 CONTROLS

All functions of the Fakerscope 2500 are controlled from the front panel keyboard which is shown overleaf in Fig. 2.

The basic function of all the keys is described below, however, please refer to the relevant part of this manual for a more detailed description of the individual functions.

CONTROL KEY	Most keys, in addition to their letter or symbol function perform a Fakerscope control function, printed in yellow at the bottom of the key. Simultaneous operation of the CONTROL KEY with another key will perform the control function. However, if the unit is not currently operating in a mode which expects the next key to be an alpha character then the yellow control function will be the key default.
SHIFT KEY	This key is used in the normal way to produce the shifted version of the keyed character, i.e. uppercase character or a symbol in the case of the number keys.

The yellow control functions are described below:

SETUP	This control will toggle the Fakerscope between the two basic modes of operation, that is the OPERATIONAL mode and the SETUP mode. SETUP mode is used to perform the following functions: 1. View and/or change setup parameters within the setup file such as parity, baud rate, stop bits etc. 2. Enter the EDIT utility which allows input, viewing and editing of any of the ten user message buffers, user trigger buffers, sync bytes or menu titles. 3. Enter the COPY utility which enables data to be copied from the TX or RX capture buffer to any of the ten message or trigger buffers. Data can also be copied between any of the message or trigger buffers. Since the SETUP control will override any other operation, it can be used as a 'panic button' to terminate any operation and return the Fakerscope to a known idle mode.
CURSOR KEYS	Used to select the various parameters and options when in the setup mode. Also used to move the cursor when in the edit or data review mode.
MONITOR CONTROLS	This group of keys are coloured blue and control the data monitor functions, they consist of the following keys:
MODE	Selects the basic mode of operation, either CONTINUOUS, i.e. monitoring is continuous and is halted by the operator or a trigger event (if triggering enabled). The second mode available is STOP WHEN FULL, in the mode data will be acquired until the capture buffer is full. This control is also used to select high-speed monitor mode, shown as H.SPEED CONT. or H.SPEED STP/FULL. This mode allows operation in **ACQUIRE ONLY** up to 72Kbps using external clock.

CODE	Will toggle the displayed data in monitor, review or edit modes between the code selected in setup and HEX.
CLEAR	Clears bit counters in BERT mode.
ACQUIRE	Used to start or stop data monitor and capture mode. The data capture buffer is always cleared each time monitor mode is started.
TRANSMIT CONTROLS	This group of keys are coloured red and control the TRANSMIT or MESSAGE GENERATOR functions, they consist of the following keys:
MODE	Sets one of five possible basic modes of operation, these are; CONTINUOUS – in this mode the selected message is transmitted over and over when started by the user until stopped by the user. SINGLE MESSAGE – causes the selected message to be sent once each time run key is pressed. SINGLE CHARACTER – sends one character at a time from the selected message each time the run key is pressed. POLLED or MULTI-POLL – will send the selected message once each time a trigger event occurs. TERMINAL EMULATE – used in conjunction with monitor mode to enable the display and keyboard to be used as a terminal device.
MESSAGE	Selects the message that is to be transmitted. Eleven different messages are possible, ten user defined, one 'canned' 'fox' message.
DCE/DTE	Selects which pin number on the V24 interface the message generator will use for transmit data, pin 2 or pin 3.
RUN	Used to start/stop message generator operation, also used to start/stop Bit Error Rate Test.
DATA REVIEW CONTROLS	This group of keys are coloured green and control the captured data review functions, they consist of the following keys:
REVIEW	Enters the captured data review mode and displays the contents of the data capture buffer.
BEGIN	Moves the cursor and display to the physical start of the capture buffer.
SEARCH	Enters the buffer string search mode.
DUMP	Dumps the contents of the capture buffer to serial or parallel printer.
EXIT	Terminates data review mode and returns the unit to idle.

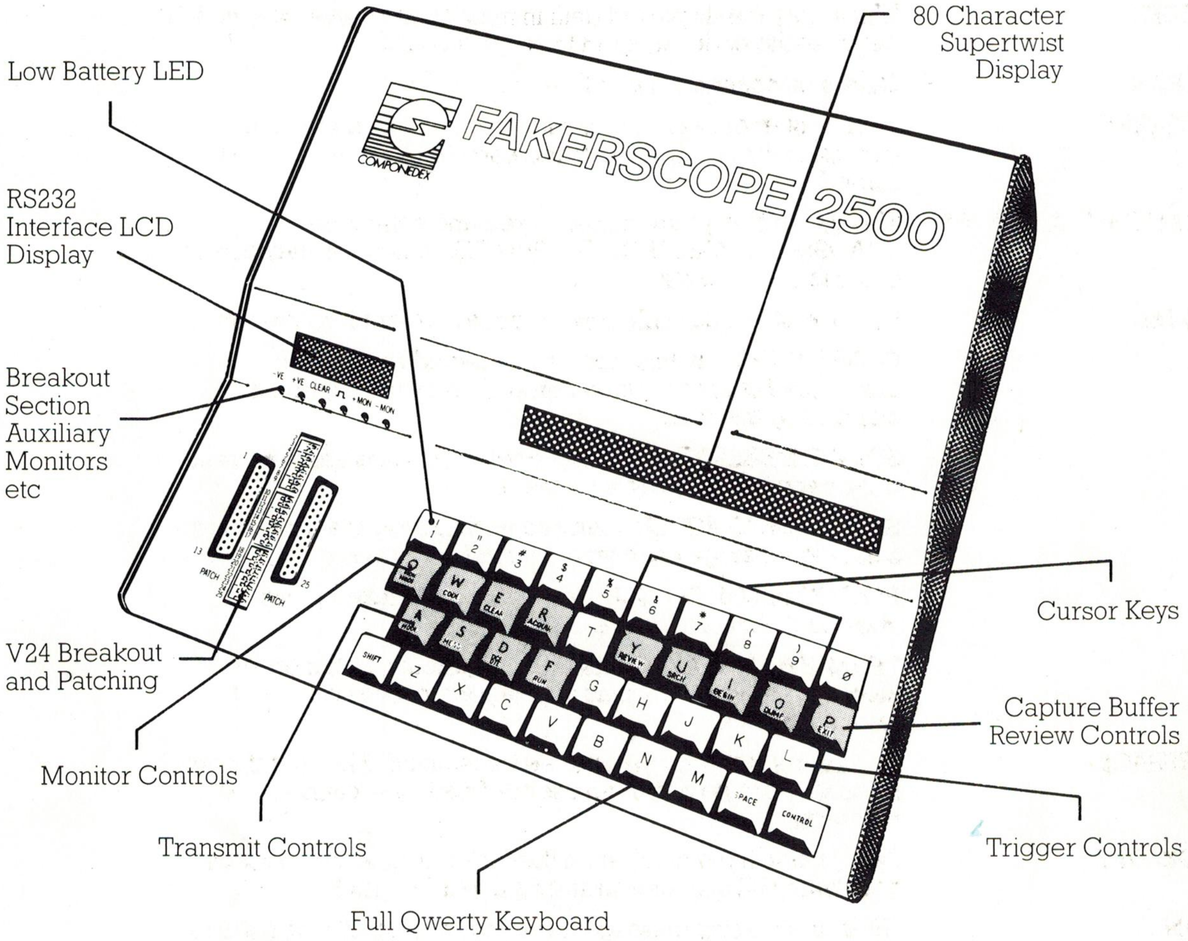

Low Battery LED
80 Character Supertwist Display
RS232 Interface LCD Display
Breakout Section Auxiliary Monitors etc
V24 Breakout and Patching
Monitor Controls
Transmit Controls
Full Qwerty Keyboard
Trigger Controls
Capture Buffer Review Controls
Cursor Keys
COMPONEDEX
FAKERSCOPE 2500
-VE +VE CLEAR ⎍ +MON -MON
PATCH
SHIFT
SPACE
CONTROL

FIG. 2 FAKERSCOPE 2500 CONTROLS

TRIGGER CONTROLS	This group of keys are coloured grey and control the data capture trigger functions as follows:
MODE	Selects the trigger function to be off, active in DTR mode or active in user trigger string compare mode. If the latter mode of operation is selected the same control also selects the desired trigger string number.
POSITION	Selects the position in which the trigger event will appear in the capture buffer, either PRE (at the beginning), CENT (in the middle) or POST (at the end). A fourth option COUNT is also selected using this control, this is used in conjunction with the count facility to count the number of trigger string matches in the captured data.
OTHER KEYS	
STATUS	Selects between the available status displays.
BERT	Enters the Bit Error Rate Test mode.
ERROR	Used to inject errors in BERT mode.

3.0 I/O ARRANGEMENTS

Fig. 3 Shows the I/O connector arrangements, also position of the power switch and mains adaptor/charger input.

Fig. 4 Shows the electrical interface arrangement.

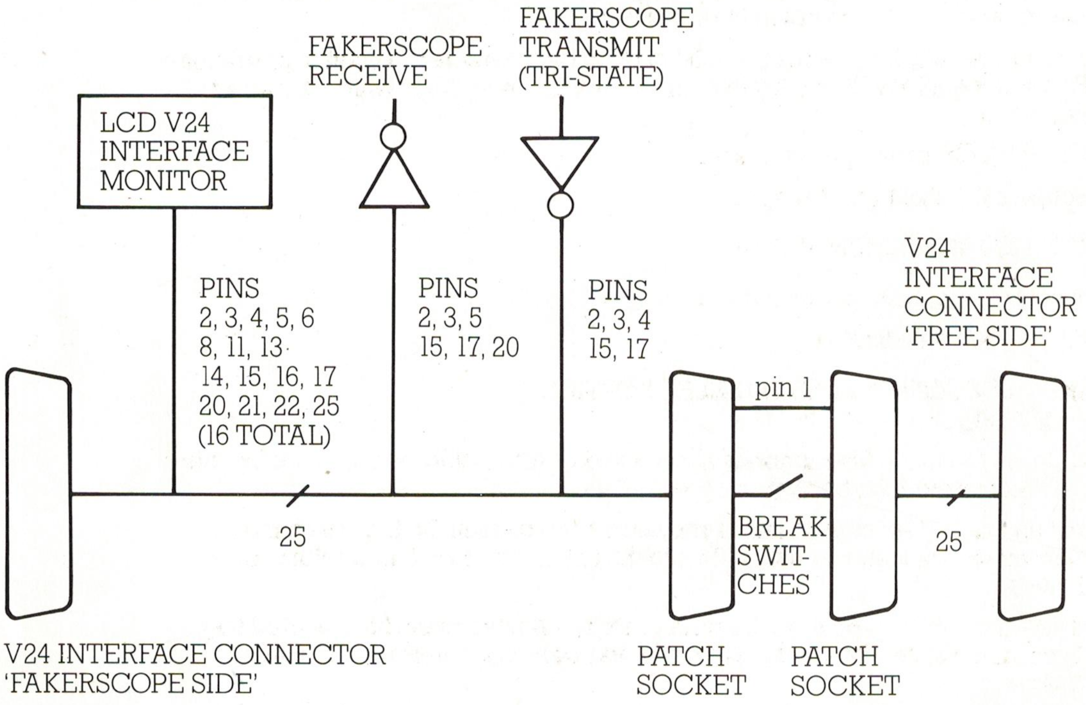

FAKERSCOPE TRANSMIT (TRI-STATE)
FAKERSCOPE RECEIVE
LCD V24 INTERFACE MONITOR
PINS 2, 3, 4, 5, 6 8, 11, 13 14, 15, 16, 17 20, 21, 22, 25 (16 TOTAL)
PINS 2, 3, 5 15, 17, 20
PINS 2, 3, 4 15, 17
V24 INTERFACE CONNECTOR 'FREE SIDE'
pin 1
25
BREAK SWIT-CHES
25
V24 INTERFACE CONNECTOR 'FAKERSCOPE SIDE'
PATCH SOCKET
PATCH SOCKET

FIG.3 ELECTRICAL INTERFACE ARRANGEMENTS

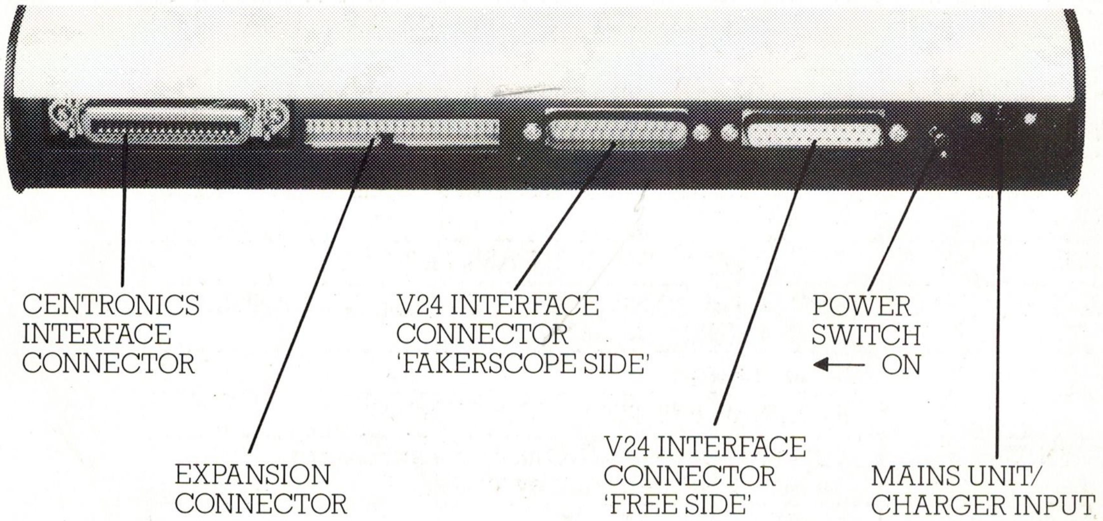

CENTRONICS INTERFACE CONNECTOR
V24 INTERFACE CONNECTOR 'FAKERSCOPE SIDE'
POWER SWITCH
← ON
EXPANSION CONNECTOR
V24 INTERFACE CONNECTOR 'FREE SIDE'
MAINS UNIT/ CHARGER INPUT

FIG.4 I/O CONNECTORS

4.0 SETUP PROCEDURES

The basic operational parameters of the Fakerscope are input via a SETUP MENU. The Fakerscope 2500 contains ten such setup menu files. Each setup menu file contains all the parameters needed to configure the Fakerscope 2500 for a particular mode of operation. Once a setup file has been configured it will remain in non-volatile storage and can be called up and loaded at any time, thus with just three keystrokes the Fakerscope 2500 operating parameters may be completely reconfigured.

Each setup menu file may be assigned a 'title' of up to ten characters. When in operational mode the Fakerscope 2500 will display the current menu file number which is loaded together with its title.

To enter SETUP MODE press the setup key.

The Fakerscope 2500 should then display:

```
ENTER REQUIRED SETUP NUMBER (0-9)
```

At this point enter the desired setup number.

The Fakerscope 2500 will display:

```
SETUP MENU – USE ARROW KEYS TO SELECT OPTION
SETUP n      ttttttttt          <  > ^  v
```

Where n would be the menu file number selected and ttttttttt would be the menu file title, if no title has been entered the title would show --------

At this point if all that is desired is to load a previously setup menu file then pressing the SETUP key again will load that menu file into the Fakerscope 2500 and return to operational mode.

Alternatively if it is desired to change the parameters within the menu file selected then the cursor keys (arrows) can be used to select the various parameters and options as described below.

When all the desired parameters have been selected, pressing the setup key (at any position within the setup file) will store all parameters in the non-volatile menu file store, load all the setups from that menu into the Fakerscope 2500 and return to operational mode.

The table below is a summary of the various setup options available.

RECEIVE BAUD RATE	19200, 9600, 7200, 4800, 3600, 2400, 1800, 1200, 600, 300, 150, 134.5, 110, 75, 50
TRANSMIT BAUD RATE	As for RECEIVE, different value may be selected.
DATA BITS	5, 6, 7, 8
PARITY	NONE, ODD, EVEN
STOP BITS	1, 1.5, 2
DATA CODE	ASCII, EBCDIC, BAUDOT, IPARS, EBCD, HEX
BASIC MODE	ASYNC, 8 BIT SYNC, 16 BIT SYNC, SDLC (NRZI), HDLC, SDLC-AS (NRZI), HDLC-AS
DUPLEX	FULL OR HALF
CLOCK	INTERNAL, EXTERNAL, SOURCE, SPLIT
DISPLAY SYNCS	YES or NO. Used in SYNC mode to suppress sync characters and avoid display "clutter".
FLOW CONTROL	NONE, X-ON/X-OFF, DTR
SENSE (X-ON/TRIG)	PIN 2 or pin 3
SYNC BYTES	USER DEFINABLE
OUT OF SYNC	USER DEFINABLE; out of sync character and number of consecutive occurances to qualify.

SELECTING OPERATIONAL PARAMETERS AND OPTIONS

Using the UP and DOWN arrows will select the different operating parameters i.e. Transmit Baud Rate, Number of Stop Bits, etc. Whilst the LEFT and RIGHT arrows can be used to select the desired parameter value, i.e. 2400 Baud, 2 Stop Bits, etc.

Two parameters serve as an entry into the EDIT and COPY utilities and therefore have no left and right selection functions. The EDIT and COPY utilities can be entered from any setup menu file number and their operation is dealt with in separate sections of this manual.

4.1 SETUP MENU OPTIONS EXPLANATION

The various menu parameters are explained below.

RECEIVE BAUD	Sets the internal clock to the baud rate desired for PIN 3 on the interface, i.e. the BOTTOM line on the LCD display.
TRANSMIT BAUD	Sets the internal clock to the baud rate desired for PIN 2 on the interface, i.e. the TOP line on the LCD display. This parameter also controls the baud rate at which the internal message generator runs.
No. DATA BITS	Selects the desired number of data bits per character, not including start, stop or parity bits.
PARITY	Selects the required parity checking/generating options.
No. STOP BITS	Selects the required number of stop bits, only required for async operation.
DATA CODE	Selects to data code, can be ASCII, EBCDIC, BAUDOT, IPARS, EBCD, HEX
BASIC MODE	This parameter sets the basic mode of operation for the Fakerscope. ASYNC sets ASYNCHRONOUS mode operation, according to the parameters set above. 8 BIT SYNC or 16 BIT SYNC sets SYNCHRONOUS (COP) mode, according to the relevant parameters above. 8-BIT SYNC will set the Fakerscope to work with ONE sync character whilst with 16 BIT SYNC set synchronisation will occur after a TWO character sync pattern. Further options for this parameter are SDLC (DIRECT), SDLC (NRZI), HDLC (DIRECT), HDLC-ADDRESS SEARCH (DIRECT), SDLC-ADDRESS SEARCH (NRZI) and SDLC-ADDRESS SEARCH (DIRECT). Selecting any of these will result in the Fakerscope being configured in SDLC/HDLC or BOP synchronous mode operation. The difference between SDLC/HDLC and SDLC/HDLC-ADDRESS SEARCH is that selecting either of the ADDRESS SEARCH options results in only SDLC or HDLC frames with a specific address (or global address, FF) being received. The frame address is contained in the first non-flag character at the beginning of the frame. When using ADDRESS SEARCH mode the search address is programmed into the first sync character position. (setup, edit, option 3.) For SDLC formats a choice of (DIRECT or (NRZI) encoding is available.

CLOCK	The four options available perform the following functions: INTERNAL – Enables the internal baud rate generator to provide the timing for all transmit and receive data. For ASYNC mode operation this option MUST be selected. NOTE: For SYNC mode operation this option should NOT normally be used. If this option is selected for SYNC operation a restricted number of Baud Rates is available. These are: 19200, 9600, 4800, 2400, 1800, 1200. A value of less than 1200 will result in a baud rate of 1200. EXTERNAL – Disables the internal baud rate generator and allows the timing for transmit and receive data to be taken from an external source, i.e. a modem via pins 15 and 17 respectively. SOURCE – Enables the internal baud rate generator to provide the timing for transmit and receive but in addition outputs the same clock onto pins 15 and 17 (TXC and RXC) such that some external device may be clocked by the same timing reference as the Fakerscope. SPLIT – Enables the internal baud rate generator to provide timing for transmit data and outputs the same clock onto pin 15 but configures the receive data clock to external mode, i.e. receive clock must be provided by external equipment or pin 17 (or a wire link from the source on pin 15).
DUPLEX	Selecting HALF DUPLEX will cause the transmit data to be controlled by the signals RTS (Request To Send) and CTS (Clear To Send) on pins 4 and 5 of the V24 interface respectively. When the Fakerscope is ready to start sending data it will drive RTS true (+12V). Data transmission will commence when the signal CTS becomes true (+12V). If at any time during transmission of the data block (message) CTS becomes false data transmission will cease until the signal again becomes true. With FULL DUPLEX selected the Fakerscope will drive RTS true when the message generator is put in a RUN condition and will remain true until the message generator is stopped. Data will be transmitted regardless of the state of CTS.
DISPLAY SYNCS	Setting this option to NO will suppress the display and capture of any occurrence of the programmed sync byte.
FLOW CONTROL	When the Fakerscope is configured in async mode the message generator can be programmed to respond to flow control if enabled here. See section 14.0.
SENSE	This parameter selects which line is sensed for the X-ON/X-OFF character when using flow control or on which line the trigger string is sensed if using trigger functions.
COPY FUNCTIONS	This setup parameter serves as an entry to the COPY utility. See section 7.0.
VIEW/EDIT FUNCTIONS	This setup parameter serves as an entry into the EDIT utility. See section 6.0.

5.0 USER MESSAGE BUFFERS

The Fakerscope contains ten 256 byte user message buffers.

While in the EDIT mode (setup) these buffers may be inspected or changed as explained in section 6.0. It is important that the EOM (End Of Message) marker (shown as an up arrow in edit mode) is set correctly.

The EOM marker sets the logical end of the buffer if less than the 256 bytes available are needed to hold the user message. Failure to set the EOM marker will result in the whole buffer (256 bytes) being transmitted even if the desired message only occupies the first few bytes in the buffer.

If it is desired to set up a user message that is longer than 256 bytes it is possible to join any number of consecutive buffers together, giving a total message length of up to 2560 bytes. To join a buffer to the next highest buffer number the EOM marker is set to the first character position in the lower number buffer. This will result in the whole of the lower buffer plus the part of the higher buffer up to the EOM marker comprising the user message. This process can be repeated in order to link any number of consecutive buffers together, up to a total of ten.

To SET the EOM marker press up arrow while in edit mode when the cursor is in the desired position.

To MOVE the EOM marker simply SET it in the desired new position.

To MOVE the EOM to BUFFER END either SET it in the last buffer position or OVERWRITE it with data.

The EOM is non destructive and thus if it is set over a data byte, that byte will still be intact if the EOM is subsequently moved.

6.0 USING THE EDITOR UTILITY

The EDIT utility is used to input, inspect, or change the contents of any of the ten user message buffers, the ten user trigger strings, sync byte values and out-of-sync byte values for any of the ten setup menu files and the setup menu file titles.

The Fakerscope edit utility is able to change, insert, delete and, in addition, work in any of the normal Fakerscope codes, i.e. ASCII, EDBDIC, BAUDOT, IPARS, EBCD, and HEX.

To enter the edit utility select the VIEW/EDIT FUNCTIONS parameter in SETUP mode. The Fakerscope 2500 will display the following:

```
VIEW/EDIT FUNCTIONS, KEY:
MESSAGES=1   TRIGGERS=2   SYNCS=3/5   TITLE=4
```

At this point select the desired option, but note the following.

Options 1 & 2 will allow editing of any message buffer or trigger buffer of the ten of each available but options 3, 4 & 5 will default to editing either the sync bytes, menu title or out-of-sync character for the active setup menu file only.

Entering option 1 will result in the following display:

```
EDIT/VIEW USER MESSAGE
ENTER MESSAGE NUMBER TO EDIT:
```

Entering option 2 would give:

```
EDIT/VIEW USER TRIGGER
ENTER TRIGGER NUMBER TO EDIT:
```

At this point the desired message or trigger number is keyed, the appropriate buffer will now be loaded and edit mode is entered.

Once a buffer has been loaded for editing the top line on the LCD display shows the current editor status, and the bottom line contains the actual data being edited. For example if trigger buffer 2 had been selected for editing the display would show:

```
EDIT: TRIGGER 02 CODE=ASCII   INSERT v=END
this is the buffer contents.
```

EDIT UTILITY COMMANDS

KEY	FUNCTION
Left Arrow	Moves the cursor backwards through the edit buffer.
Right Arrow	Moves the cursor forwards through the edit buffer.
Up Arrow	Sets the EOM (end of message) marker at the cursor position.
Down Arrow	Exit edit mode and return to setup menu file. L and R arrow keys will auto repeat if held down.
Delete	Character delete.
Insert	Toggles insert mode (status line shows if in insert mode).
Code	Will change the code being used to display and enter alphanumeric characters. Each operation of the key will toggle the code between the current selected code and HEX.

THE END OF MESSAGE MARKER

It is important that the EOM (End Of Message) marker (shown as an up arrow) is set correctly.

The EOM marker sets the logical end of the buffer, if less than the available number of bytes are needed to hold the message or trigger string. Failure to set the EOM correctly will result in the WHOLE buffer being transmitted as a user message, or used as a trigger compare string even if the desired message only occupies the first few bytes in the buffer.

To SET the EOM marker press up arrow while in edit mode when the cursor is in the desired position. i.e. one position after the last message or trigger character.

To MOVE the EOM marker simply SET it in the desired new position.

To MOVE the EOM to BUFFER END either SET it in the last buffer position or OVERWRITE it with data.

The EOM is non destructive and thus if it is set over a data byte, that byte will still be intact if the EOM is subsequently moved.

7.0 USING THE COPY UTILITY

The COPY utility provides a means of moving message and trigger strings from one buffer to another. One message buffer may be copied to another as can trigger strings, in addition message buffers may be copied into trigger buffers and vice-versa. Perhaps the most useful feature of this utility is the ability to copy data from the transmit or receive data capture buffers into any message or trigger buffer. This facility may be used to transfer a captured polling sequence into a user message buffer and subsequently use the Fakerscope to emulate one end of a previously monitored comms link. Another use is the ability to 'down line load' user messages or triggers from a terminal or other device, rather than key the messages by hand on the Fakerscope keyboard.

To enter the COPY utility select the COPY FUNCTIONS parameter in SETUP mode. The Fakerscope will display the following:

```
COPY FUNCTIONS:
KEY 1 TO START
```

Enter '1', the Fakerscope will display:

```
KEY: CT=TX ACQ,CR=RX, Un=USER,Tn=TRIG
COPY FROM?
```

At this point the 'copy from' buffer must be entered. The entry takes the form of a two character code, the first character selects the buffer type from which the data will be copied, 'C' for capture buffers, 'U' for user message buffers or 'T' for trigger buffers.

The second character identifies the actual buffer, 'T' for transmit capture buffer, 'R' for receive capture buffer or a digit from 0-9 if either a message or trigger buffer has been specified.

The top line of the display serves as a reminder of these codes.

Once the 'copy from' buffer has been entered the response will be:

```
COPY TO?
```

Again a two character code must be entered to identify the 'copy to' buffer, in the same format as above.

Once the 'copy to' buffer has been input the copy operation will be performed, resulting in the message:

```
COPY FINISHED..........
```

If the buffer specified as the 'copy from' buffer is larger than the 'copy to' buffer then copying will start from the beginning of the larger buffer for as many bytes as will fit into the 'copy to' buffer.

When copying data from any of the data capture buffers, data will be copied starting from the REVIEW CURSOR position for as many bytes as will fit into the 'copy to' buffer. Therefore it is necessary to enter REVIEW mode and position the first character to be copied at the cursor (far righthand) position before entering the COPY utility. After the copy has been completed the review cursor will be placed one character after the last character copied and so if it is desired to copy the next consecutive chunk of data into another buffer (as in creating a message longer than 256 bytes, using two consecutive message buffers) it is not necessary to reposition the review cursor before the next copy.

8.0 STATUS DISPLAYS

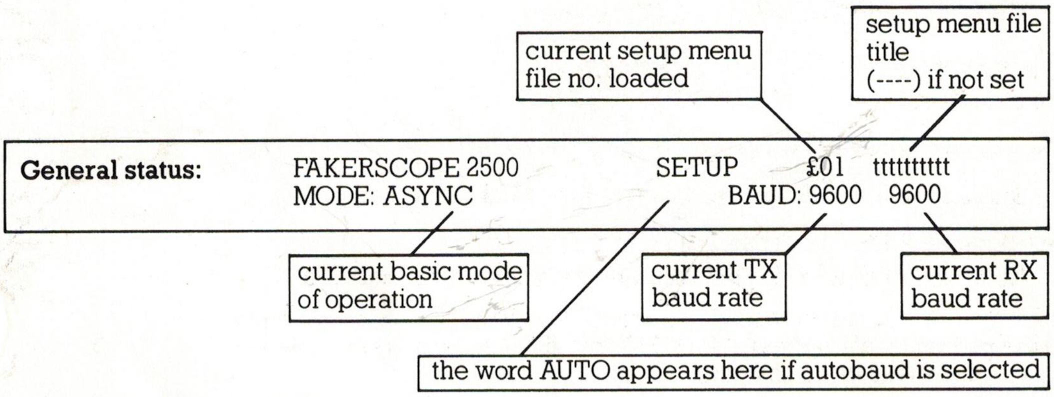
When the Fakerscope is in operational mode and is in any state apart from captured data review mode or Bit Error Rate Test a Three level status display is available to keep the user informed as to the current operational conditions. The three status displays are GENERAL STATUS, MONITOR STATUS and TRANSMIT STATUS and can be sequentially selected by pressing the STATUS key, each time the STATUS key is pressed the status display will advance to the next status display in sequence. If the Fakerscope is not acquiring data the sequence is as follows:

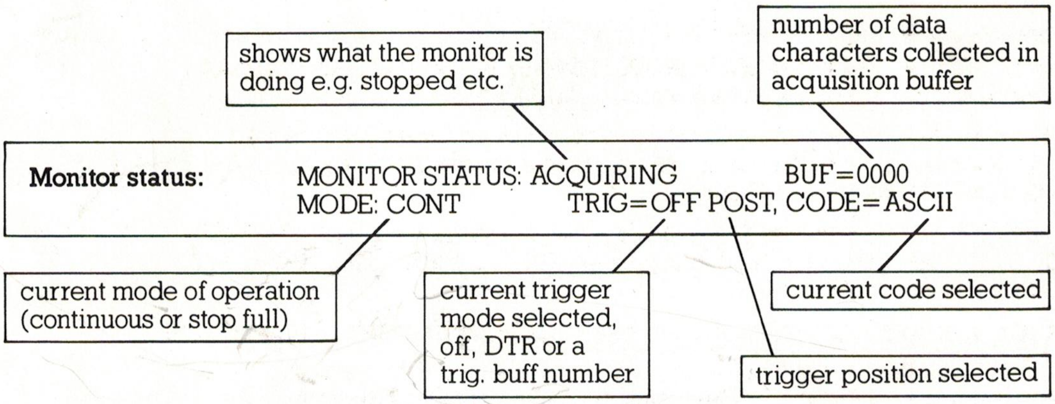
GENERAL STATUS – MONITOR STATUS – TRANSMIT STATUS – GENERAL STATUS etc.

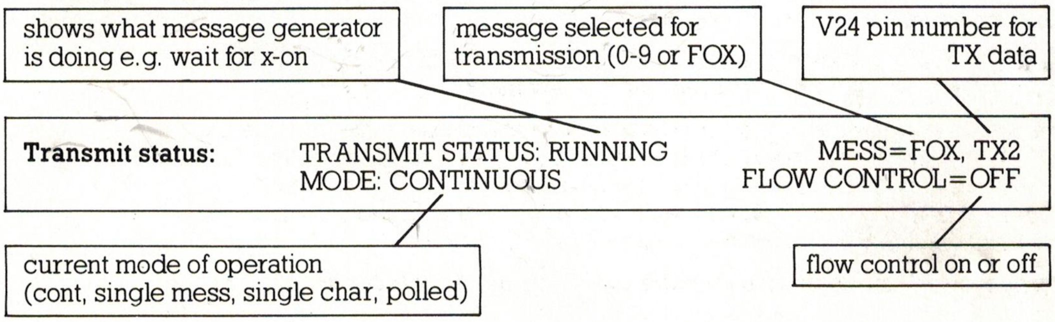
If the Fakerscope is acquiring data the sequence is:

ACQUIRED DATA – GENERAL STATUS – MONITOR STATUS – TRANSMIT STATUS – ACQUIRED etc.

The format of the various status displays is shown below:–


current setup menu file no. loaded
setup menu file title (----) if not set
General status:
FAKERSCOPE 2500
SETUP
£01
tttttttttt
MODE: ASYNC
BAUD: 9600
9600
current basic mode of operation
current TX baud rate
current RX baud rate
the word AUTO appears here if autobaud is selected


shows what the monitor is doing e.g. stopped etc.
number of data characters collected in acquisition buffer
Monitor status:
MONITOR STATUS: ACQUIRING
BUF=0000
MODE: CONT
TRIG=OFF POST, CODE=ASCII
current mode of operation (continuous or stop full)
current trigger mode selected, off, DTR or a trig. buff number
current code selected
trigger position selected


shows what message generator is doing e.g. wait for x-on
message selected for transmission (0-9 or FOX)
V24 pin number for TX data
Transmit status:
TRANSMIT STATUS: RUNNING
MESS=FOX, TX2
MODE: CONTINUOUS
FLOW CONTROL=OFF
current mode of operation (cont, single mess, single char, polled)
flow control on or off

9.0 MONITORING & CAPTURING DATA

The following step-by-step instructions for performing the various operations with the Fakerscope 2500 assume that the user has read the preceding sections of this manual and is familiar with the Fakerscope 2500 setup and procedures and controls.

This section deals with the MONITOR facility.

To use the MONITOR/CAPTURE facility:–

1. Enter SETUP mode and set the basic working parameters i.e. sync/async, baud rate, number of data bits etc., as described in section 4 'setup procedures'.
2. Check and adjust if necessary all three status displays so that they conform to the following:

```
FAKERSCOPE 2500        SETUP £xx        xxxxxxxxxxx
MODE: yyyyy              BAUD    yyyy   yyyy

MONITOR STATUS: OFF                  BUF=xxxx
MODE: CONT          TRIG=OFF xxxx,CODE=yyyyy

TRANSMIT STATUS: OFF           MESS=FOX,TX2
MODE: CONTINUOUS          FLOW CONTROL=OFF
```

   Where: xxx=don't care   yyy=application dependent

3. Connect data link or device to be monitored to V24 interface at rear.
4. Press the ACQUIRE key.
5. The display will now change to show the monitored data being received.

   If no data is present on the display, check the left hand RS232 state display and confirm the presence of a signal in TXD, RXD or both. If no signals are present check cables, external equipment etc.

   If signals TXD or RXD are present on the display then return to SETUP mode and check that the data format set agrees with the data being monitored.

6. To stop acquiring data, press the ACQUIRE key again.

   The display will now revert to MONITOR STATUS. The BUF=nnnn field will show the number of characters in the data capture buffer.

   In the above mode data monitoring is continuous and is terminated only by the ACQUIRE key. If more than 4K characters have been received the capture buffer will contain the LAST 4K characters received.

   If MODE:STOP FULL is selected then data capture and monitor will halt after 4096 characters have been received and thus the capture buffer will contain the FIRST 4K characters received.

7. It is possible to review any data in the capture buffer, whilst remaining in the acquire mode.

   This feature is particularly useful when using the Fakerscope in TERMINAL EMULATE mode, allowing the user to scroll back through the captured data in order to read a list of options sent by a host device, without having to stop the acquire mode and enter review mode.

   To review data whilst still in acquire mode key LEFT or RIGHT arrows and the display will scroll as for normal captured data review mode.

   This feature can only practically be used when there is a pause in the data being received. If the arrows have been used to scroll back or forward through the capture buffer and some new data arrives on the interface then the Fakerscope will automatically return the display to the point where the last captured data is, i.e. to the point at which it was before the review keys were used.

   Cursor position and buffer search functions are not available in this mode.

9.1 USING THE HIGH SPEED MONITOR MODE

The Fakerscope 2500 is equipped with a high speed monitor mode to enable data capture up to 72K bits per second, using external clock mode.

With the high speed monitor mode selected no Fakerscope transmit functions are available, in addition, the following restrictions apply to monitoring in high-speed monitor mode:

1. Must be used in SYNC or SDLC/HDLC modes
2. External clock only to be used
3. Trigger functions are available up to 48Kbps, but not at higher speeds.

To select high speed monitor mode, use the MONITOR MODE key to select one of the functions as shown below:

```
MONITOR STATUS  :  OFF                                    BUF  =  nnnn
MODE            :  H.S. CONT TRIG = sss  ssss             CODE =  sssss
```

Mode H.S. selects high speed, continuous capture mode

```
MONITOR STATUS  :  OFF                                    BUF  =  0000
MODE            :  H.S. S/FULTRIG = sss ssss              CODE =  sssss
```

Mode H.S. S/FULL selects high speed, stop when capture buffer full mode

10.0 REVIEWING CAPTURED DATA

Any data that is displayed on the display while the Fakerscope is in ACQUIRE mode will be recorded in a 8K first-in-first-out capture buffer (4K for the TRANSMIT line and 4K for the RECEIVE line).

This data may be reviewed at any time the Fakerscope is idle, i.e. not in setup, not acquiring data and not generating a message.

Captured data review mode is entered by keying REVIEW

The display will now show the last characters received for both transmit and receive with the last character received in the cursor (far right hand) position.

The data is displayed in a "real time relationship" with characters received on pin 2 on the top line and characters received on pin 3 on the bottom line.

If no characters were received for pin 3 at the time a character arrives for pin 2 then a "dot" will be displayed in the corresponding position for pin 3, and vice-versa.

DATA REVIEW MODE COMMANDS

RIGHT ARROW	Moves the display FORWARD through the capture buffer. Holding the key down will result in AUTO-REPEAT. If the key is held for over 10 seconds the auto-repeat will speed up.
LEFT ARROW	Moves the display BACKWARD through the capture buffer. AUTO-REPEAT is as for RIGHT ARROW.
UP ARROW POSITION	Changes the display from data to show the current CURSOR in the capture buffer. The cursor position is always the far right hand position of the display, and the characters that PRECEDE the position are displayed. The cursor position will INCREMENT and DECREMENT with the RIGHT and LEFT arrow keys respectively.
DOWN ARROW	Will revert from CURSOR POSITION display to DATA DISPLAY.
CODE	Alternates the code between the current selected code and HEX. When data is displayed in HEX only the twelve characters preceding the cursor position are displayed as opposed to thirty nine when using any of the other codes. The character at the cursor position remains in the same position.
SEARCH	Enter string search mode.
BEGIN	Moves the to cursor to the physical begining of the buffer.
EXIT	Exit data review mode.

10.1 DATA REVIEW STRING SEARCH FUNCTION

When reviewing captured data because of the size of the capture buffer, finding the particular data of interest can be somewhat tedious using the scroll keys, so a data search facility has been provided.

The string search facility is entered by keying 'SRCH' while in review mode. After 'SRCH' is keyed the Fakerscope will display:

```
ENT. SEARCH KEY: CODE=ASCII        v=END
xxxxxxxxxxxxxxxxxxxxxxxxxx
```

The Fakerscope has in fact entered the EDIT MODE and now expects the string to be searched for to be entered. The search string can be up to thirty two characters long and is entered/edited in precisely the same way as the user messages or triggers; see section 6.0 'Using the editor facility'.

When the string has been entered (don't forget to enter the EOM to mark the end of the search string) key DOWN ARROW to exit. The display will now show:

```
SEARCH TX or RX BUFFER (T or R)?
```

At this point enter 'T' or 'R' depending on which buffer is to be searched.

The Fakerscope will now search the selected buffer for the string entered. If a match is found the display will revert to normal review mode with the cursor positioned over the data containing the string.

If the string is not found the message SEARCH: STRING NOT FOUND is displayed. Normal review mode is then re-entered with the cursor position unchanged.

The character ASCII 'Z' may be entered in the search string as a 'DON'T CARE' character, e.g. entering a search string of 'ZZZZ SCOPE' would match with a data string of 'FAKA SCOPE' or 'TELE SCOPE' etc.

10.2 REVIEWING CAPTURED DATA IN SDLC/HDLC MODES

Any data that is displayed on the display while the Fakerscope is in ACQUIRE mode will be recorded in an 8K first-in-first-out capture buffer (4K for the TRANSMIT line and 4K for the RECEIVE line).

This data may be reviewed at any time the Fakerscope is idle, i.e. not in setup, not acquiring data and not generating a message.

Captured data review mode is entered by keying LEFT ARROW.

The display will now show the last characters received for both transmit and receive with the last character received in the cursor (far right hand) position.

The data is displayed in a "real time relationship" with characters received on pin 2 on the top line and characters received on pin 3 on the bottom line.

If no characters were received for pin 3 at the time a character arrives for pin 2 then a "dot" will be displayed in the corresponding position for pin 3, and vice-versa.

On entry into review mode the SDLC or HDLC data is displayed in a non-decoded format and might appear as shown below:

```
12✓][. . . . . . .][1 2 3 4 5 ✓][. . . .][a b c d e f ✓][Monday ✓][
. . .][ABCDEF ✓][. . . .][1 2 3 4 5 6 7 8 9 SOMEDATA ✓][. . . .
```

At this level the Fakerscope will have performed three functions on the captured data:

1. Filtered out any frames not containing the selected address (if address search mode was selected in setup)
2. Inserted the symbol][to show where the frames begin and end.
3. Checked the frame check sequence (FCS) or CRC and, if good will display the symbol ✓ before the end of frame marker, if bad will display the symbol ✗ before the end of frame marker.

The above data display is a result of the Fakerscope operating in

LEVEL 1 DECODE

This will display the data in exactly the same way, whether working in SDLC or HDLC modes.

Two further levels of decode are available, these are known as:

LEVEL 2 DECODE & LEVEL 3 DECODE

When either of these two options are selected the frame whose start of frame marker is nearest to the cursor position is taken and displayed in a decoded format.

LEVEL 2	Will decode the frame at the link level according to either the SDLC protocol or HDLC protocol, depending on the option selected for the basic mode of operation in the setup menu.
LEVEL 3	Will decode the frame at the packet level, either X-25 or SNA depending on the option selected for the basic mode of operation in the setup menu; selecting any of the HDLC options will result in a level 3 decode in X-25, selecting any of the SDLC options will result in a level 3 decode in SNA.

The level 2 (SDLC/HDLC) and level 3 (X-25/SNA) frame decoding modes are described in detail later in this manual.

DATA REVIEW MODE COMMANDS IN DECODE LEVEL 1

RIGHT ARROW	Moves the display FORWARD through the capture buffer. Holding the key down will result in AUTO-REPEAT. If the key is held for over five seconds the auto-repeat will speed up.
LEFT ARROW	Moves the display BACKWARD through the capture buffer. AUTO-REPEAT is as for RIGHT ARROW.
UP ARROW	Changes the display from data to show the current CURSOR POSITION in the capture buffer. The cursor position is always the far right hand position of the display, and the characters that PRECEDE the position are displayed. The cursor position will INCREMENT and DECREMENT with the RIGHT and LEFT arrow keys respectively.
DOWN ARROW	Will revert from CURSOR POSITION display to DATA DISPLAY.
CODE	Alternates the code between the current selected code and HEX. When data is displayed in HEX only the 12 characters preceeding the cursor position are displayed as opposed to 39 when using any of the other codes. The character at the cursor position remains in the same position.
SEARCH	Enter string search mode.
BEGIN	Moves the cursor to the physical beginning of the buffer.
2	Select level 2 decode (SDLC/HDLC).
3	Select level 3 decode (X-25/SNA).
EXIT	Exit data review mode.

10.3 DATA REVIEW MODE COMMANDS IN DECODE LEVEL 2 OR 3

RIGHT ARROW	Moves the display FORWARD through the various decoding levels as follows:

Selected Level	
2	[HDLC decode]>[HDLC info]>[Next frame]>etc.
2	[SDLC decode]>[SDLC info]>[Next frame]>etc.
3	[HDLC decode]>[X-25 decode]>[X-25 data]>[Next frame]>etc.
3	[SDLC decode]>[SNA decode]>[SNA data]>[Next frame]>etc.

LEFT ARROW	Moves the display BACKWARD through the various decoding levels as follows:

Selected Levels	
2	etc.<[Previous frame]<[HDLC decode]<[HDLC info]
2	etc.<[Previous frame]>[SDLC decode]<[SDLC info]
3	etc.<[Previous frame]<[HDLC decode]<[X-25 decode]<[X-25 data]
3	etc.<[Previous frame]<[SDLC decode]<[SNA decode]<[SNA data]

UP ARROW	Moves the display BACKWARD to the previous frame in the capture buffer regardless of the decode position of the current frame, i.e. Skip to previous frame.
DOWN ARROW	Moves the display FORWARD to the next frame in the capture buffer regardless of the decode position of the current frame, i.e. Skip to next frame.
CODE	Alternates the code between the current selected code and HEX.
EXIT	Select level 1 decode.
2	Select level 2 decode (SDLC/HDLC).
3	Select level 3 decode (X-25/SNA).

See section for decoded frame formats.

10.4 CAPTURE BUFFER DUMP FACILITY

In addition to being able to review the captured data on the LCD display the Fakerscope provides a means of dumping the contents of the capture buffer to a printer or other device.

The output may be either parallel via the Centronics port or serial via the V24 port.

To enter the buffer dump utility key 'DUMP' when the Fakerscope is idle, i.e. not acquiring, message generator off, and not in setup.

The Fakerscope then displays:

CAPTURE BUFFER DUMP
CENTRONICS OR SERIAL? (KEY C or S)

Then key either 'C' or 'S' depending on the type of device used.
This results in the display:

BUFFER DUMP IN PROGRESS.......

The entire capture buffer will now be sent to the connected device. Transmit and Receive data are printed in pairs of lines, such that the time relationship between transmit and receive data may be studied, in the same way as for review mode on the LCD display.

Data is printed in HEX together with a decode to the right hand side in whatever code has been selected, e.g. ASCII, EBCDIC, BAUDOT etc.

The buffer dump can be stopped before the whole buffer is printed by pressing the 'SETUP' key.

If serial mode is selected the data will be transmitted in whatever format is set up in the currently loaded menu file.

Below is a sample output from the buffer dump utility:

```
COMPONEDEX FAKERSCOPE 2500        CAPTURE BUFFER DUMP

CURRENT CURSOR POSITION IS 0996

0000    TX  04  17  07  06  0E  0F  04  19  0A  18  13  0C  04  0D  18  1D    QUICK BROWN FOX
        RX  80  80  80  80  80  80  80  80  80  80  80  80  80  80  80  80    . . . . . . . . . . . . . . . .

0016    TX  04  0B  07  1C  16  05  04  18  1E  01  0A  04  10  14  01  04    JUMPS OVER THE
        RX  80  80  80  80  80  80  80  80  80  80  80  80  80  80  80  80    . . . . . . . . . . . . . .

0032    TX  12  03  11  15  04  09  18  1A  04  9B  96  97  93  81  8A  90    LAZY DOG ˆ012345
        RX  80  80  80  80  80  80  80  80  80  80  80  80  80  80  80  80    . . . . . . . . . . . . . . . .

0048    TX  95  87  86  98  88  82  1F  10  14  01  04  17  07  06  0E  0F    6789../ THE QUICK
        RX  80  80  80  80  80  80  80  80  80  80  80  80  80  80  80  80    . . . . . . . . . . . . . . . .

0064    TX  04  19  0A  18  13  0C  04  0D  18  1D  04  0B  07  1C  16  05    BROWN FOX JUMPS
        RX  80  80  80  80  80  80  80  80  80  80  80  80  80  80  80  80    . . . . . . . . . . . . . . . .

0080    TX  04  18  1E  01  0A  04  10  14  01  04  12  03  11  15  04  09    OVER THE LAZY D
        RX  80  80  80  80  80  80  80  80  80  80  80  80  80  80  80  80    . . . . . . . . . . . . . .

0096    TX  18  1A  04  9B  96  97  93  81  8A  90  95  87  86  98  88  82    OG ˆ0123456789..
        RX  80  80  80  80  80  80  80  80  80  80  80  80  80  80  80  80    . . . . . . . . . . . . . . .
```

11.0 SENDING THE PRE-PROGRAMMED 'FOX' MESSAGE

To send the canned message THE QUICK BROWN FOX etc., proceed as follows:–

1. Enter SETUP mode and set the basic working parameters, i.e. sync/async, baud rate, number of data bits etc., as described in section 4.0 'Setup procedures'.
2. Check and adjust if necessary all three status displays so that they conform to the following:

```
FAKERSCOPE 2500      SETUP £xx      xxxxxxxxxx
MODE: yyyyy           BAUD yyyy    yyyy

MONITOR STATUS: OFF              BUF=xxxx
MODE:CONT          TRIG=OFF xxxx,CODE=yyyyy

TRANSMIT STATUS: OFF            MESS=FOX,TXy
MODE: CONTINUOUS          FLOW CONTROL: OFF
```

   Where: xxx=don't care   yyy=application dependent

3. Connect, for example, a terminal to the V24 interface at rear.
4. Press the RUN key.
5. The display will switch to TRANSMIT STATUS if it is not already there and should show:

```
TRANSMIT STATUS: RUNNING          MESS=FOX,TXy
```

   The left hand RS232 status display should show RTS as active and indicate the presence of the transmit data on TXD or RXD.

6. The message THE QUICK BROWN FOX etc., should now be received by the device plugged into the V24 interface.
7. To stop the message press the RUN key again.

If either of the modes SINGLE MESSAGE or SINGLE CHAR. are selected then, after pressing the RUN key the Fakerscope will transmit the message once (if SINGLE MESSAGE was selected) or transmit one character of the message (if SINGLE CHAR. was selected) and the halt with the message:

```
TRANSMIT STATUS: WAIT (SGL.) MESS=FOX,TXy
```

This indicates that the message or character has been sent and the Fakerscope is now waiting for the RUN key to be pressed, which will send the message again, or the next character of the message.

To return the message generator from a 'WAIT' state the 'OFF' condition MODE must be returned to 'CONTINUOUS' using the MODE key, the next operation of the RUN key will cause the message generator to return to OFF.

12.0

SENDING A USER-PROGRAMMED MESSAGE

To send a user-programmed message is essentially the same as sending a pre-programmed 'fox' message, with the exception that a user message buffer must first be set up, then the MESS field in the TRANSMIT STATUS display must be set using the MESSAGE key to select the desired message number for transmission.

To send a user-programmed message:

1. Enter SETUP mode and set the basic working parameters, i.e. sync/async, baud rate, number of data bits etc., as described in section 4.0 'Setup procedures'.
2. Using the EDIT utility enter the message for transmission in one of the USER MESSAGE BUFFERS.
3. Check and adjust if necessary all three status displays so that they conform to the following:

```
FAKERSCOPE 2500       SETUP £xx      xxxxxxxxxx
MODE: yyyyy          BAUD yyyy yyyy

MONITOR STATUS: OFF                BUF=xxxx
MODE: CONT           TRIG=OFF xxxx,CODE=yyyyy

TRANSMIT STATUS: OFF          MESS=nn, TXy
MODE: CONTINUOUS           FLOW CONTROL=OFF
```

Where: xxx=don't care yyy=application dependent nn=message buffer #

The MESS field is selected using the MESSAGE key.

3. Connect, for example, a terminal to the V24 interface at rear.

4. Press the RUN key.

5. The display will switch to TRANSMIT STATUS if it is not already there and should show:

```
TRANSMIT STATUS: RUNNING      MESS=nn, TXy
```

The left hand RS232 status display should show RTS as active and indicate the presence of the transmit data on TXD or RXD.

6. The message THE QUICK BROWN FOX etc., should now be received by the device plugged into the V24 interface.

7. To stop the message press the RUN key again.

SINGLE MESSAGE and SINGLE CHARACTER modes are the same as explained in the previous section 'Sending the pre-programmed "fox" message'.

13.0

MONITORING THE MESSAGE GENERATOR OUTPUT

It is possible to set up the Fakerscope to transmit a message to a device at the same time monitor this output on the LCD display. This output is also recorded in the capture buffer together with any response that may come from the device under test, in order that any relationship between stimulus and response may be studied.

This is just a matter of combining the MESSAGE GENERATOR and CAPTURE/ DISPLAY functions.

As an example to send the FOX message and monitor it simultaneously, proceed as follows:–

1. Enter SETUP mode and set the basic working parameters, i.e. sync/async, baud rate, number of data bits etc., as described in section 4.0 'Setup procedures'.
2. Check and adjust if necessary all three status displays so that they conform to the following:

```
FAKERSCOPE 2500        SETUP £xx    xxxxxxxxxx
MODE: yyyyy              BAUD yyyy    yyyy

MONITOR STATUS: OFF                  BUF=xxxx
MODE: CONT            TRIG=OFF xxxx,CODE=yyyyy

TRANSMIT STATUS: OFF           MESS=FOX,TXy
MODE: CONTINUOUS            FLOW CONTROL=OFF
```

   Where: xxx=don't care   yyy=application dependent

3. Press the ACQUIRE key; the Fakerscope will now be in MONITOR mode.
4. Press the RUN key; the message generator will now start running and the data transmitted will be seen on the display.
5. The monitor mode and the message generator run independently of one another and so both keys (ACQUIRE and RUN) must be pressed in order to stop both the monitor mode and the message generator.

14.0 USING THE MESSAGE GENERATOR WITH FLOW CONTROL

It is possible to configure the message generator to respond to two types of FLOW CONTROL.

What is FLOW CONTROL? It is a method by which a device that is receiving data can tell the sender to temporarily stop sending data to, for example allow an input buffer to be emptied and prevent a data overflow.

The two most common types of flow control are:–

DTR, where the receiving device drops the control signal DTR (or possibly CTS) to tell the sender to stop sending data. When the receiver is ready to take more data DTR is raised back to a true level.

X-ON/X-OFF, where the receiving device sends back a serial character to the transmitting device known as X-OFF (Hex 13) to stop the flow of data. Data flow is resumed when the receiving device sends another character known as X-ON (Hex 11).

The Fakerscope message generator will support both of these systems of flow control by selecting either DTR or X-OFF in the FLOW CONTROL section of the SETUP MENU.

Confirmation that the message generator is configured to work with flow control can be gained from the TRANSMIT STATUS display, which will show:

```
TRANSMIT STATUS: OFF        MESS=FOX,TXy
MODE: CONTINUOUS          FLOW CONTROL=X-ON
```

or

```
TRANSMIT STATUS: OFF        MESS=FOX,TXy
MODE: CONTINUOUS          FLOW CONTROL=DTR
```

Before running the message generator with X-ON/X-OFF flow control check the SENSE parameter in the SETUP MENU to ensure that the X-ON/X-OFF characters will be sensed on the correct interface pin.

15.0 USING THE AUTOBAUD FUNCTION

The AUTOBAUD function, when selected will cause the Fakerscope to sample the data that is being monitored and automatically determine and load the baud rate at which the data is being sent.

This is useful where the data rate of the system under test is not known or as a means of simply speeding up the setup process.

To invoke the AUTOBAUD function press the AUTOBAUD key when the monitor function is OFF, the status should show:

```
FAKERSCOPE 2500      SETUP £xx   xxxxxxxxxx
MODE: yyyyy         AUTOBAUD yyyy yyyy
```

Now put the Fakerscope into monitor mode by keying ACQUIRE.
The display will switch to MONITOR STATUS and show:

```
MONITOR STATUS: AUTOBAUD SEARCH BUF=xxxx
MODE: CONT       TRIG=OFF xxxx,CODE=yyyyy
```

The Fakerscope will now sample the data present on pin 3 (receive data) of the V24 interface and attempt to determine the baud rate. When the baud rate has been determined the Fakerscope will show:

```
MONITOR STATUS: ACQUIRING          BUF=nnnn
MODE: CONT            TRIG=OFF xxxx,CODE=yyyyy
```

The display/capture buffer will now start to acquire data.

NOTE: The AUTOBAUD function will only sample data on pin 3 (RXD) of the V24 interface connector.

If NO DATA is detected on pin 3 the Fakerscope will wait for some data indefinitely until returned to OFF by the operator or some data is detected on the interface.

Once data is detected the AUTOBAUD calculation takes about 2 seconds.

The calculated baud rate will be displayed in the GENERAL STATUS and will remain loaded until SETUP is entered or ACQUIRE is re-entered with AUTOBAUD enabled.
The AUTOBAUD function will be disabled if the MESSAGE GENERATOR is RUNNING.

Note: The AUTOBAUD function will only sense the baud rate from data received on pin 3 of the breakout panel. AUTOBAUD sets up only the baud rate. PARITY, DATA BITS etc. are unaffected.

16.0 USING THE TRIGGER FUNCTION

The Fakerscope is provided with a range of TRIGGER functions which allow the user to capture just the portion of data of interest, or to only trap and record an error condition.

The trigger section of the Fakerscope is controlled by two keys, used in conjunction with the A TRIGGER BUFFER or the interface signal DTR. The TRIGGER facility would be used with the ACQUIRE data mode to either start or stop the DATA CAPTURE BUFFER at a pre-determined point.

The key functions are as follows:

MODE	Alters the TRIG=display in the MONITOR STATUS display and controls the basic trigger function, which can be set to any of the following: OFF, 0-9 or DTR If one of the digits 0-9 is selected then the trigger will be active in trigger string compare mode, using the user trigger string indicated by the number. If DTR is selected then the trigger will be active and triggered by the V24 signal DTR becoming active (+12V) on pin 20.
POSITION	Controls where the trigger string is placed in the data capture buffer after the trigger event has occurred and can have one of the following values, again shown in the MONITOR STATUS display: PRE, CENT or POST PRE causes the TRIGGER EVENT to be at the start of the capture buffer, i.e. the capture buffer will contain the data for both TX and RX which FOLLOWED the TRIGGER EVENT. CENT will cause the TRIGGER EVENT to be in the centre of the capture buffer, i.e. the capture buffer will contain data which occurred BEFORE, AND data which occurred AFTER the TRIGGER EVENT. POST causes the TRIGGER EVENT to be at the end of the capture buffer, i.e. the capture buffer will contain the data which PRECEDED the TRIGGER EVENT.

If the USER trigger function is to be used, a USER TRIGGER BUFFER must be set up to contain the desired trigger string (a single byte, up to a 32 byte string). The USER TRIGGER BUFFER is set up in the SETUP MENU, using the EDIT utility as described in section 6.0.

After the TRIGGER EVENT has occurred and the data has been captured, the data acquisition will stop, resulting in the display:

```
MONITOR STATUS: HALTED, TRIGGERED BUF=nnnn
MODE: CONT          TRIG=nn yyyy, CODE=yyyyy
```

17.0 USING THE MESSAGE GENERATOR IN POLLED-RESPONSE MODE

It is possible to configure the Fakerscope to send a message, either FOX or USER, each time a TRIGGER EVENT occurs.

This feature is useful for emulating such devices as polled terminals, etc., where a host system requires a specific reply to an enquiry or poll.

The Fakerscope may be set to work in this mode the following way:

1. Enter the SETUP mode and set the basic working parameters, i.e. Baud rate, number of data bits, etc., as described in section 4.0 'Setup procedures'.
2. Program the USER TRIGGER BUFFER using the EDIT utility (don't forget the EOM!), to contain the byte or string to which the Fakerscope will respond (the POLL SEQUENCE).
3. Program a USER MESSAGE BUFFER to contain the byte or string that will be sent in response to recognising the POLL SEQUENCE.
4. Check and adjust if necessary all three status displays so that they conform to the following:

```
FAKERSCOPE 2500      SETUP £xx    xxxxxxxxxx
MODE: yyyyy         BAUD yyyy yyyy

MONITOR STATUS: OFF            BUF=xxxx
MODE: CONT       TRIG=tt   POST,CODE=yyyyy

TRANSMIT STATUS: OFF          MESS=nn ,TXy
MODE: POLLED              FLOW CONTROL=OFF
```

Where: xxx=don't care   yyy=application dependent   nn=message buffer £
tt=trigger buffer £

5. Press the ACQUIRE key.
6. Press the RUN key.

The Fakerscope will now enter ACQUIRE mode and search for the POLL SEQUENCE, on recognising a valid POLL the MESSAGE GENERATOR will output the selected message once (up to the EOM marker) and then re-enter the poll search mode. This sequence is repeated until the ACQUIRE key is pressed.

To return the message generator from a 'WAIT (POLL)' state to the 'OFF' condition the MODE must be returned to 'CONTINUOUS' using the MODE key, the next operation of the RUN key will cause the message generator to return to OFF.

17.1 USING THE MESSAGE GENERATOR IN MULTI-POLL MODE

The Multi-poll mode of operation is similar in operation to the POLLED-RESPONSE mode, but instead of sending a nominated message number in response to recognising a nominated trigger number MULTI-POLL mode continuously scans the incoming data for an occurrence of any of the first THREE trigger numbers and will then transmit the corresponding message number in response. i.e.

A match with trigger 0 causes message 0 to be transmitted
A match with trigger 1 causes message 1 to be transmitted
A match with trigger 2 causes message 2 to be transmitted

The Fakerscope may be set to work in this mode the following way:

1. Enter the SETUP mode and set the basic working parameters i.e. Baud rate, number of data bits, etc. as described in section 4.0 'Setup procedures'.
2. Program the first THREE USER TRIGGER BUFFERS (0, 1, 2) using the EDIT utility (don't forget the EOM!), to contain the bytes or strings to which the Fakerscope will respond (the POLL SEQUENCES).

3. Program the first THREE USER MESSAGE BUFFERS to contain the bytes or strings that will be sent in response to recognising the POLL SEQUENCE.
4. Check and adjust if necessary all three status displays so that they conform to the following:

```
FAKERSCOPE 2500          SETUP £xx          xxxxxxxxxx
MODE: yyyyy                BAUD yyyy yyyy

MONITOR STATUS: OFF                    BUF=xxxx
MODE: CONT          TRIG=00          POST, CODE=yyyyy

TRANSMIT STATUS: OFF           MESS=00, TXy
MODE: MULTI-POLL           FLOW CONTROL=OFF
```

Where: xxx=don't care yyy=application dependent

5. Press the ACQUIRE key.
6. Press the RUN key.

The Fakerscope will now enter ACQUIRE mode and search for the POLL SEQUENCE, on recognising a valid POLL the MESSAGE GENERATOR will output the corresponding message once (up to the EOM marker) and then re-enter the poll search mode. This sequence is repeated until the ACQUIRE key is pressed.

To return the message generator from a 'WAIT(POLL)' state to the 'OFF' condition the MODE must be returned to 'CONTINUOUS' using the MODE key, the next operation of the RUN key will cause the message generator to return to OFF.

18.0 BIT ERROR RATE TESTING

What is a Bit Error Rate Test?

A Bit Error Rate Test or BERT is an industry standard test for checking the integrity of a serial data link.

The method used is to transmit a stream of bits that conform to a specific pattern across a serial data link. The data bits are then checked at the remote end of the link for any errors.

The data pattern used by the Fakerscope is known as a 511 pattern. This is a pseudo-random stream of bits that repeat every 511 bits.

The Fakerscope is capable of generating and sending a 511 bit pattern in any of the asynchronous formats up to 19200 baud or synchronously up to 19200 baud, 8 data bits only.

In addition to generating the 511 pattern the Fakerscope can receive and check a 511 pattern.

A FULL DUPLEX link may be checked by transmitting the 511 pattern at one end, looping the data back at the remote end, and feeding the received data back into Fakerscope, for checking. The Fakerscope will display the number of bits received and the number of bits that were received in error.

A HALF DUPLEX link may be checked by transmitting the 511 pattern into one end of the link and then receiving the pattern at the remote end with ANOTHER Fakerscope or test device capable of receiving and checking a 511 pattern.

To set up a 511 BERT test proceed as follows:

1. Enter the SETUP mode and set the basic working parameters, i.e. Baud rate, number of data bits, sync/async etc., as described in section 4.0 'Setup procedures'.
2. Press the BERT key.
3. The LCD display will now show:

```
B E R T (511PATTERN)           STOP
TOTAL BITS=00000000     ERRORS=00000000
```

4. Connect the Fakerscope to the circuit to be tested in such a way that data transmitted to the circuit under test via the V24 interface connector of the Fakerscope is looped back to receive pin (pin 2 or 3, depending on which pin has been selected for transmission) of the Fakerscope.
5. Press the RUN key to start the test.

The Fakerscope will now start sending the 511 pattern and this should be seen on the left hand RS232 state display.
The Fakerscope receive channel will now try to sync onto the incoming 511 data pattern.

When the receiver has been able to sync on the received data pattern the TOTAL BITS counter will start to show the number of bits received. If any errors are detected the ERRORS counter will show the number of bit errors.

As a confidence check on the error checker a deliberate error may be injected into the transmitted 511 pattern by pressing the 'ERROR' key. This will inject 1 error each time it is pressed, which the error checker should record.

If an error rate of over 25% is encountered the Fakerscope will assume sync has been lost and will return to the sync search mode and suspend bit and error counting until sync has been regained.

511 TEST PATTERN

The standard 511 bit pattern is a pseudo-random bit stream which repeats every 511 bits. The Fakerscope will use this bit pattern to assemble and transmit characters according to the data format set, i.e. if a character length of 8 bits is set the first 8 bits will be sent in the first character, the next 8 in the second and so on until all 511 bits are used, at which point bit number one and subsequent bits in the pattern will be used over again. If a character length of 7 bits were set, only 7 bits of the pattern would be used for each character.

The 511 bit pattern is given below in 7 BIT HEX which gives a total length of 73 bytes. It should be noted that when character lengths of 8, 6 or 5 bits are used to send the bit pattern, 511 is not divisible exactly by these numbers and so the bit pattern will 'slide' through the byte boundarys. It should also be noted that the 511 pattern shown below is shown as it would be transmitted for 7 bit characters, the 1sb of the 511 pattern being the 1sb of the first character and the msb of the 511 pattern being the msb of the last character.

511 bit pattern in 7 bit HEX

```
51 33 02 29 6E 62 73 33 23 25 1C 36 75 48 11 02 08 62 10 27 35 58 17 3B 22
21 2D 7E 26 52 7D 49 15 33 40 31 0A 4B 7E 45 46 6B 34 1E 17 58 36 37 50
75 2B 05 14 75 69 1D 70 5C 64 6B 15 12 40 43 5E 4D 05 77 61 7F 60 7E
```

19.0 CENTRONICS PORT

This port provides a means of sending the selected message in a parallel, CENTRONICS compatible format, and can be used for testing printers, etc., that use a Centronics type interface.

The message is output when the message generator is placed in RUN.

The SINGLE MESSAGE function is as for serial operation. (see section 11.0)

The Centronics port can also be used to dump the contents of the capture buffer on a Centronics compatible printer or device; see section 10.3 'Capture buffer dump facility'.

CENTRONICS PORT SPECIFICATION

The connections used on the Fakerscope Centronics port are given below. All signals are active low (0V) unless stated.

Pin 1	Data Strobe
Pin 2	Data bit 0
Pin 3	Data bit 1
Pin 4	Data bit 2
Pin 5	Data bit 3
Pin 6	Data bit 4
Pin 7	Data bit 5
Pin 8	Data bit 6
Pin 9	Data bit 7
Pin 11	Busy (active high)
Pin 16 & 19-30	0v (signal return)

Data strobe pulse width is 6.5 miscrosec.

20.0 BATTERY CHARGING

Under normal conditions the Fakerscope internal batteries should power the unit for between 3 and 3.5 hours from a full charge.

A two pole co-axial power socket is provided on the left hand side of the unit for connection to either a Fakerscope mains power unit or car charging lead.

The mains power unit will simultaneously power the Fakerscope and charge the batteries. In this mode the batteries will take about 24 hours to charge. With the power unit connected but the Fakerscope powered off about 15 hours is required to reach full charge.

If it is desired to use some other power source instead of the Componedex mains adaptor, the following specification should be adhered to:

VOLTAGE: min 10.0 VDC, max 16.0 VDC

POLARITY: Centre connection +, Outside connection 0V.

LOW BATTERY INDICATOR

An LED indicator is provided to the left of the SETUP key.

The LED will light when approx 15 minutes of battery operation remains.

If the battery does fail while the unit is in use no data or setup information will be lost.

21.0 BREAKOUT/RS232 STATE MONITOR SECTION

The breakout and RS232 state monitor section of the Fakerscope is situated to the left of the keyboard.

The breakout panel consists of two 25 way D type connectors and is divided into two parts, the LEFT and RIGHT separated by 24 miniature switches which can be used to isolate the LEFT and RIGHT parts to allow PATCHING between the two sections.

All inputs and outputs to the Fakerscope are taken from the RIGHT side of the switches; the right hand D connector is connected pin for pin to the right hand V24 connector (looking from the front) at the rear of the unit.

The left hand D connector on the patch field is connected pin for pin to the left hand V24 connector (again looking from the front) at the rear of the unit. Thus any signal connected to the left hand V24 connector (from front) of the unit can be completely isolated from the Fakerscope circuits by opening the appropriate switch on the patch field.

The RS232 state monitor consists of an LCD display which permanently monitors the most commonly used RS232 signals.
If the signal is true (+3V to +12V) then the corresponding mnemonic will be visible on the display.

The displayed mnemonics, together with their meaning and associated V24 interface pin numbers are given below:

MNEMONIC	MEANING	V24 PIN NUMBER
TXD	Transmit Data	2
RXD	Receive Data	3
RTS	Request To Send	4
CTS	Clear To Send	5
DSR	Data Set Ready	6
CD	Carrier Detect	8
DRS	Data Rate Select	11
cts	Secondary Clear To Send	13
txd	Secondary Transmit Data	14
TXC	Transmit Clock	15
rxd	Secondary Receive Data	16
RXC	Receive Clock	17
DTR	Data Terminal Ready	20
SQ	Signal Quality	21
RI	Ringing Indicator	22
25	V24 pin 25	25

Three additional indicators are provided; there are a floating RS232 monitor, a floating true negative RS232 monitor and a 'pulse catch' monitor.

The floating RS232 monitor shows the symbol +M and is connected to the socket below the display marked +mon.

The floating true negative RS232 monitor will display the symbol −M only when the input socket below the display marked −mon is connected to a proper FALSE RS232 signal, i.e. −3V to −12V.

This monitor can be used to differentiate between a false RS232 signal and an open circuit.

The 'pulse catch' monitor will display the symbol ⎍ and is connected to the socket below the display marked

The 'pulse catch' symbol will be displayed after any true RS232 signal has been detected at the input and will remain 'latched on' until reset by connecting the socket marked 'clear' to the socket marked '+V'.

Two outputs are provided marked +V and −V, for forcing V24 interface lines to an RS232 true or false state.

22.0 SELF TEST FACILITY

The Fakerscope 2500 is provided with a self-test facility which will test all of the basic Fakerscope functions, including CPU, RAM, I/O drivers and receivers, display, keyboard etc.

WARNING – running the test program will clear setup menu files, message and trigger buffers and data capture buffer.

To enter self test mode key '0' when the Fakerscope is first powered up and while it is still displaying the message:

```
COMPONEDEX
FAKERSCOPE 2500          Revision X.XX
```

The display will then show:

```
***** FAKERSCOPE 2500 SELF-TEST *****
are you sure you want to run SELF-TEST?
```

If 'Y' is keyed at this point the self test will be entered.

Any other key will return the Fakerscope to normal operation.

After keying 'Y' the response will be:

```
IS CENTRONICS/EXP. PORT TEST REQUIRED?
(YOU NEED TO INSTAL TEST CABLE FIRST)
```

If you do not have a Centronics Expansion port test cable hit any key other than 'Y'.

The Fakerscope will now execute a series of 11 tests in sequence.

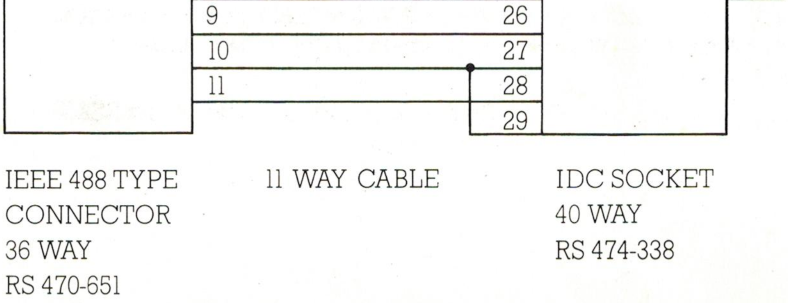
When all tests have been completed, providing no errors have occurred the Fakerscope will revert to normal operation.

A keyboard test is available the whole time that the self test sequence is executing. To use the keyboard test just hit any key, the Fakerscope will then display the value of the key in the top right hand of the display.

Two further options exist:

1. If 'r' is keyed and left displayed in the top right hand of the display then, when the test sequence is complete, instead of reverting to normal Fakerscope operation, the test sequence will be repeated indefinitely.
2, If '1' is keyed and left displayed in the top right hand of the display, this will cause the current test within the sequence to repeat indefinitely.

CENTRONICS/EXPANSION PORT TEST CABLE



23.0 TERMINAL EMULATE MODE

In this mode of operation the Fakerscope is able to act as a terminal device.

Any data received from a host device is displayed and any characters keyed on the alpha-numeric keyboard are sent to the host device.

This feature is useful for setting up devices such as multiplexers or PADs equipped with an async control port.

To use the Fakerscope in TERMINAL EMULATE MODE:–

1. Enter the SETUP mode and set the basic working parameters, i.e. Baud rate, number of data bits, etc., as described in section 4.0 'Setup procedures'.
2. Check and adjust if necessary all three status displays so that they conform to the following:–

```
FAKERSCOPE 2500      SETUP £xx      XXXXXXXXXX
MODE: ASYNC                    BAUD YYYY YYYY

MONITOR STATUS: OFF                BUF=XXXX
MODE: CONT             TRIG=OFF xxxx,CODE=YYYY

TRANSMIT STATUS: OFF           MESS=nn TXy
MODE: TERMINAL EMULATE FLOW CONTROL=OFF
```

3. Press the ACQUIRE key
4. Press the RUN key
5. Any characters keyed on the keyboard will now be sent to the device connected and will also show on the LCD display.

   Characters may also be sent in HEX by selecting HEX mode using the CODE key.
6. To stop press the RUN key and the ACQUIRE key.

If configured to operate in HDLC mode the Fakerscope will decode the following fields at the link level:

Frame Address	A two character hex display of frame address.
N(R) & N(S) Counts	A one digit decimal display if applicable to the current frame type.
P/F Bit	Displayed as 0 or 1.
Control Field	Commands and Responses are displayed in a mnemonic format, indicating the general frame type.
Frame Reject (FRMR)	The FRMR response is fully decoded to show V(R) and V(S) counts, rejected control field, type and error codes.
Data (I Field)	The Information Field of a HDLC frame is displayed in any selected code or hex.

If configured to work in SDLC mode the frame decode will be the same as for HDLC (above), but with the following addition:

Exchange Identity (XID)	Decodes an XID frame at level 0 displaying in hex the Node type, Block Number and ID number.

24.1 HDLC/SDLC DISPLAY FORMATS

General Format

Fig. 1

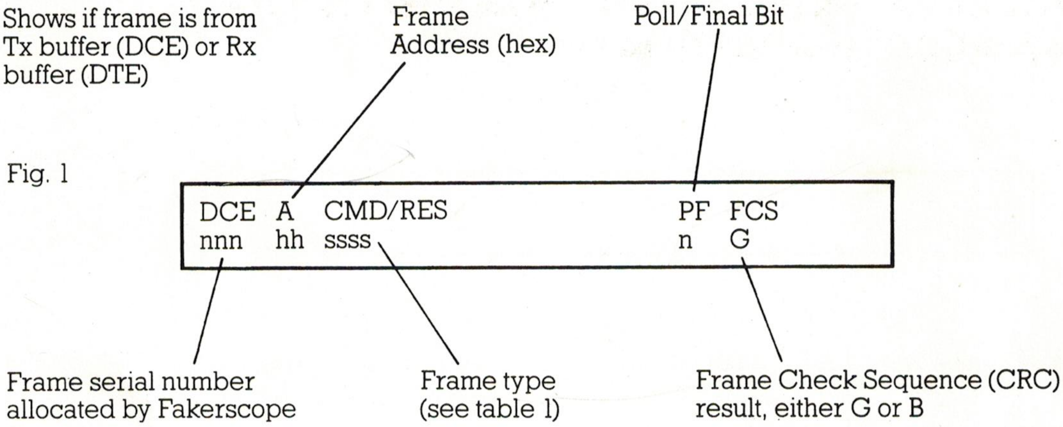

Shows if frame is from Tx buffer (DCE) or Rx buffer (DTE)
Frame Address (hex)
Poll/Final Bit
DCE A CMD/RES PF FCS
nnn hh ssss n G
Frame serial number allocated by Fakerscope
Frame type (see table 1)
Frame Check Sequence (CRC) result, either G or B

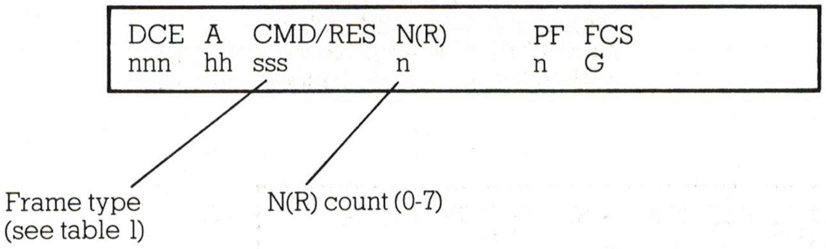
Fig. 1 above shows the general format of the HDLC/SDLC frame decode display, the fields shown are displayed for all frame types.

In the above and all following examples variable display information is portrayed as follows:

nnn	Decimal numeric data
hhh	Hexadecimal numeric data
sss	Alpha/numeric (string) data

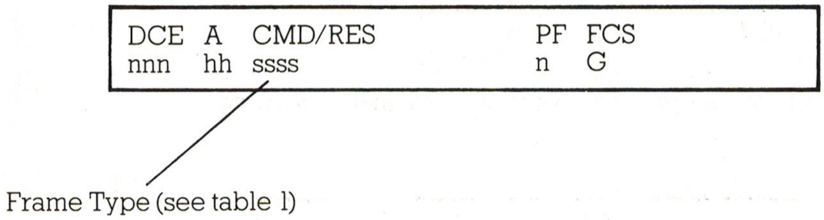
Supervisory Format

Fig. 2



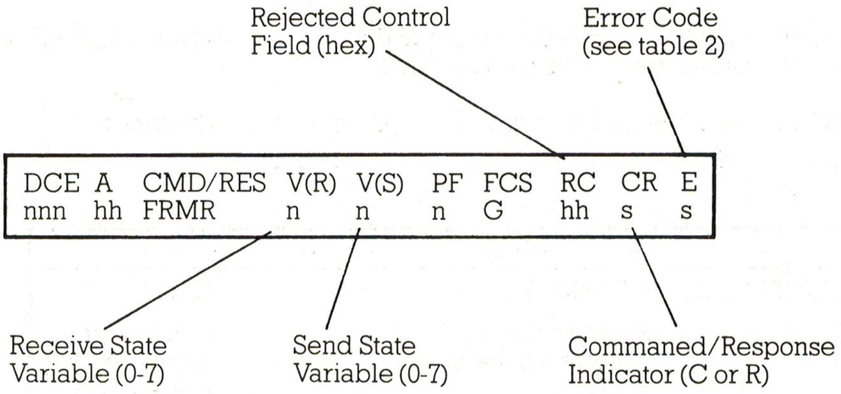
Unnumbered Format

Fig. 3



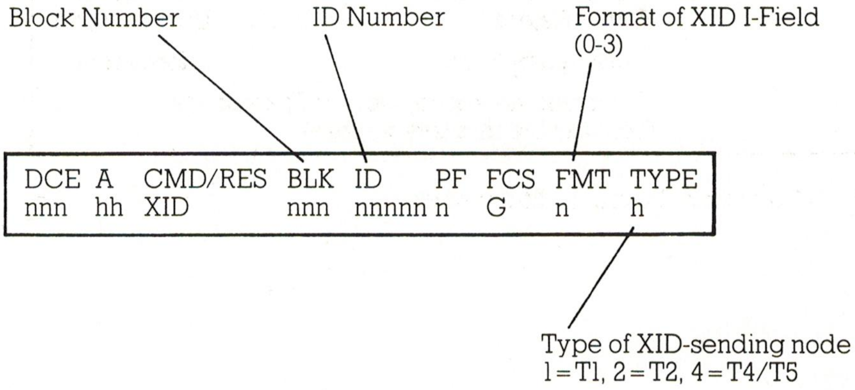
Frame Reject Format

Fig. 4



Exchange Identification Format (XID), SDLC only

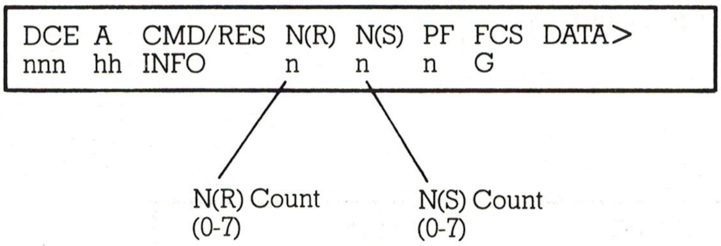
Fig. 5



Information Frame Format

Indicates Info field is to follow;
if level 3 decode enabled will show X-25>
or SNA> depending on mode selected

Fig. 6



```
DCE  A   CMD/RES  N(R)  N(S)  PF  FCS  DATA>
nnn  hh  INFO      n     n     n   G
```

The next subsequent operation of the right arrow key will result in the following I-field display:

Fig. 7

```
                 - - - - - level 2 data - - - - -
     ssssssssssssssssssssssssssssssssssssssss
```

40 Character data field, right/left arrow keys will scroll data display if whole I-field will not fit on display. Code key can be used to toggle data to hex.

Refer to section 24.2 for use of the cursor keys to move between various frames and decode levels.

HDLC		
CMD/RES MNEMONIC	MEANING	TYPE
RR	Receive Ready	Supervisory
RNR	Receive Not Ready	Supervisory
REJ	Reject	Supervisory
SABM	Set Async Balanced Mode	Unnumbered
DISC	Disconnect	Unnumbered
DM	Disconnect Mode	Unnumbered
UA	Unnumbered Acknowledgement	Unnumbered
FRMR	Frame Reject	Unnumbered
INFO	Information Frame	Information
???? hh	Command not recognised by Fakerscope (control byte displayed in hex)	

Table 1. HDLC Command/Response Mnemonics

SDLC		
CMD/RES MNEMONIC	MEANING	TYPE
RR	Receive Ready	Supervisory
RNR	Receive Not Ready	Supervisory
REJ	Reject	Supervisory
SNRM	Set Normal Response Mode	Unnumbered
RIM	Request Initialisation Mode	Unnumbered
SIM	Set Initialisation Mode	Unnumbered
DM	Disconnect Mode	Unnumbered
UP	Unnumbered Poll	Unnumbered
RD	Request Disconnect	Unnumbered
DISC	Disconnect	Unnumbered
UA	Unnumbered Acknowledgement	Unnumbered
FRMR	Frame Reject	Unnumbered
XID	Exchange Identification	Unnumbered
CFGR	Configure	Unnumbered
TEST	Test	Unnumbered
BCN	Beacon	Unnumbered
UI	Unnumbered Information	Unnumbered
INFO	Information Frame	Information
???? hh	Command not recognised by Fakerscope (control byte displayed in hex)	

Table 1a. SDLC Command/Response Mnemonics

SDLC/HDLC FRMR ERROR CODES	
ERROR CODE	MEANING
W	When set indicates control field was bad.
X	When set the frame received contained an info field which is not permitted with the command.
Y	When set N1 of the receiving station was exceeded.
Z	When set indicates invalid N(R) count.

Table 2. Frame reject error codes.

25.0 LEVEL 3 DECODE, X-25

If the Fakerscope has been configured to operate in HDLC mode then, with level 3 decode selected, the information field of the HDLC frame will be interpreted and decoded as X-25 protocol.

The following fields are decoded and displayed by the Fakerscope in X-25 mode:

Q Bit	A one bit display showing the state of the Qualifier Bit.
D Bit	A one bit display showing the state of the Delivery Confirmation Bit.
LGN	A one digit hex display showing the value of the Logical Group Number.
LCN	A two digit hex display showing the value of the Logical Channel Number.
P(R) & P(S)	A one or three digit decimal display showing the value of the Packet Send/Receive counters, if applicable to the current frame type.
User Data	The data field can be displayed in any selected code or hex.

Decoded X-25 Functions:

Call Request	Called and Calling addresses decoded and displayed, facilities and user data displayed.
Call Accept	Called and Calling addresses decoded and displayed, facilities data displayed.
Restart Req.	Cause is displayed mnemonically, Diagnostic byte displayed.
Reset Req.	Cause is displayed mnemonically, Diagnostic byte displayed.
Clear Req.	Cause is displayed mnemonically, Diagnostic byte displayed.
Diagnostic	Diagnostic code and explanation bytes displayed in hex.

Other Decoded Functions:

Interrupt, Receive Ready, Receive Not Ready, Reject.

Clear Confirmation, Reset Confirmation, Restart Confirmation.

25.1 X-25 DECODE DISPLAY FORMATS

General Format

Fig. 8

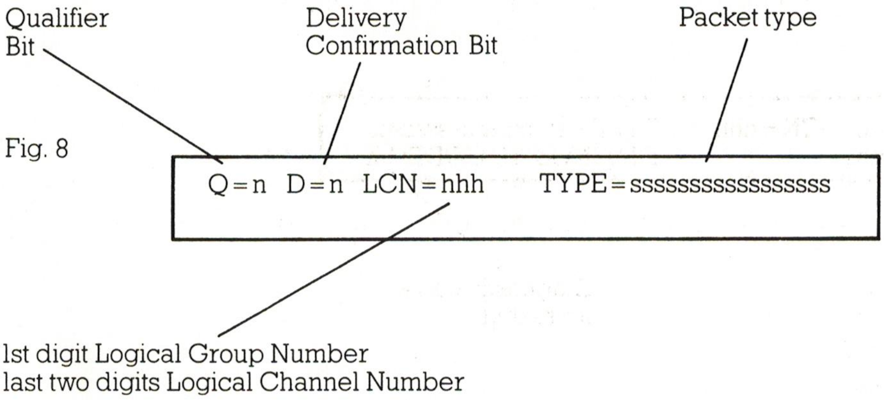

Qualifier Bit
Delivery Confirmation Bit
Packet type
Q=n D=n LCN=hhh TYPE=sssssssssssssssss
1st digit Logical Group Number
last two digits Logical Channel Number

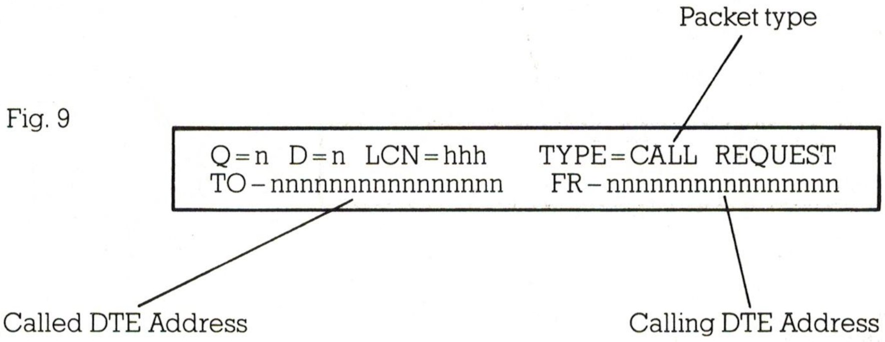
Fig. 8 above shows the general format of the X-25 frame decode display, the fields shown are displayed for all frame types.

In the above and all following examples variable display information is portrayed as follows:

nnn	Decimal numeric data
hhh	Hexadecimal numeric data
sss	Alpha/numeric (string) data

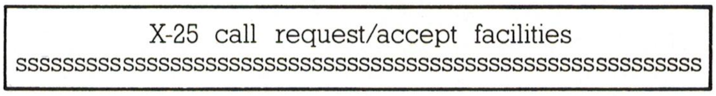
Call Accept/Call Request Format

Fig. 9


Packet type
Q=n D=n LCN=hhh TYPE=CALL REQUEST
TO–nnnnnnnnnnnnnnnn FR–nnnnnnnnnnnnnnnn
Called DTE Address
Calling DTE Address

The next subsequent operation of the right arrow key will result in the display of the facilities and user data fields:

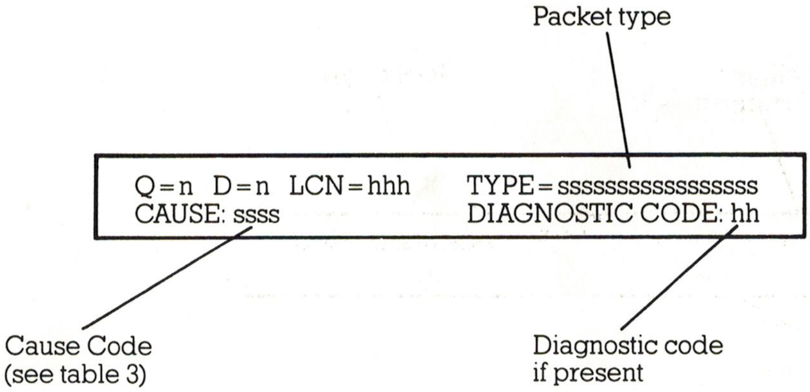
Fig. 10


X-25 call request/accept facilities
ssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssss

40 Character data field, right/left arrow keys will scroll data display if whole data field will not fit on display. Code key can be used to toggle data to hex.

Reset Request, Restart Request, Clear Request & Diagnostic Format

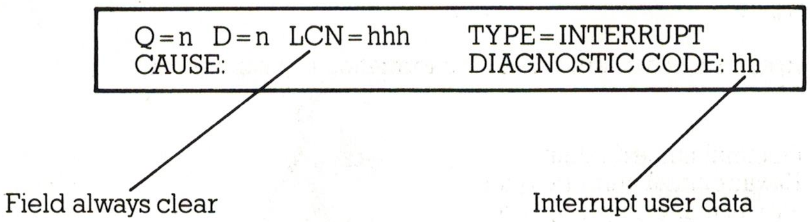
Fig. 11



```
Q=n  D=n  LCN=hhh        TYPE=sssssssssssssssss
CAUSE: ssss              DIAGNOSTIC CODE: hh
```

Interrupt Format

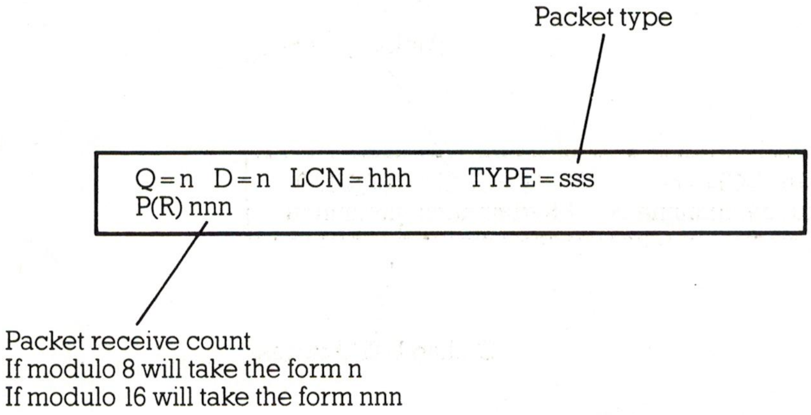
Fig. 12



```
Q=n  D=n  LCN=hhh        TYPE=INTERRUPT
CAUSE:                   DIAGNOSTIC CODE: hh
```

Receive Ready, Receive Not Ready & Reject Formats

Fig. 13

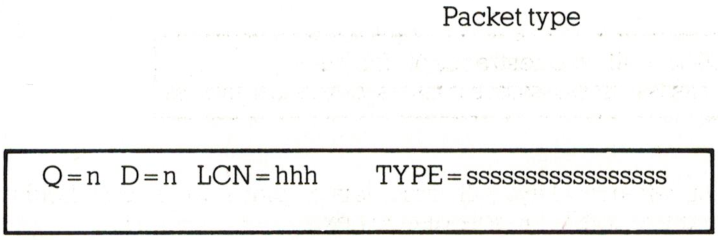


```
Q=n  D=n  LCN=hhh        TYPE=sss
P(R) nnn
```

Packet type
Packet receive count
If modulo 8 will take the form n
If modulo 16 will take the form nnn

Clear Conf., Restart Conf., Reset Conf., and Interrupt Conf. Formats

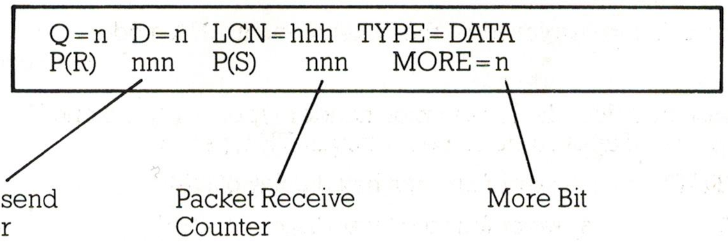
Fig. 14



```
Q=n  D=n  LCN=hhh        TYPE=sssssssssssssssss
```

Data Format

Fig. 15



```
Q=n  D=n  LCN=hhh  TYPE=DATA
P(R)  nnn   P(S)     nnn    MORE=n
```

If modulo 8 will take the form n
If modulo 16 will take the form nnn

The next subsequent operation of the right arrow key will result in the following data field display:

Fig. 16

```
-----level 3 data-----
ssssssssssssssssssssssssssssssssssssssss
```

40 Character data field, right/left arrow keys will scroll data display if whole data field will not fit on display. Code key can be used to toggle data to hex.

Refer to section 24.2 for use of the cursor keys to move between various frames and decode levels.

X-25 CAUSE CODE TABLE

CAUSE CODE MNEMONIC	MEANING
DTE	DTE Originated
OCC	Number busy
INV	Invalid facility request
NC	Network congestion
DER	Out of order
NA	Access barred
NP	Not obtainable
RPE	Remote procedure error
ERR	Local procedure error
RP	RPOA out of order
NRC	Reverse charge call refused
ICD	Incompatible destination
NFS	Fast select not subscribed
OVF	Buffer overflow
NU	Network Up
DTO	Remote DTE operational (PVC)
NO	Network operational (PVC)
IPT	Invalid packet type
PNA	Packet not allowed
TEX	Timer expired
CSP	Call set-up problem
???? hh	Cause code not recognised by Fakerscope (code displayed in hex)

Table 3. Cause Code Mnemonics for Reset Request, Restart Request, Clear Request and Diagnostic packet types.

If the Fakerscope has been configured to operate in the SDLC mode then with level 3 decode selected, the information field of the SDLC frame will be interpreted and decoded as SNA.

The following fields are decoded and displayed by the Fakerscope in SNA mode:

Transmission Header:

The Fakerscope will recognise and decode transmission header types 0, 1, 2, 3, 4 and F. The following fields are displayed if applicable to the particular TH type:

Destination Address Field (DAF)	A two or four digit hex display of DAF
Origin Address Field (OAF)	A two or four digit hex display of OAF
Sequence Number Field (SNF)	A four digit hex display of SNF
Data Count Field (DCF)	A four digit hex display of DCF
Mapping Field	Decode shows Mapping position
Flow Indicator	Decode shows normal or expedited
Local Session ID (LSID)	LSID shown mnemonically (TH type 3)

Request Header:

RU Category	RU category displayed
Response Required Field	Required response type displayed
Sense Data	Sense data is displayed in hex
RU Function	RU function is displayed mnemonically
User data	The data field can be displayed in any selected code or hex.

Response Header:

RU Category	RU category displayed
Response Type Indicator	Response type, positive or negative
Sense Data	Sense data is displayed in hex
RU Function	RU function is displayed mnemonically
User data	The data field can be displayed in any selected code or hex.

26.1 SNA DECODE DISPLAY FORMATS

General Format

The SNA decode display will follow the same basic format for all packet types and is shown below.

Fig. 17

```
 - - - TRANSMISSION HEADER DECODE - - -
- - REQUEST OR RESPONSE HDR. DECODE - -
```

The Transmission Header and Response/Request header are decoded and displayed on the upper and lower lines of the display respectively.

The next subsequent operation of the right arrow key will result in the Transmission and Request headers being displayed in a non-decoded format together with any user data contained in the frame.

Fig. 18

SNA level data (non-decoded)
ssssssssssssssssssssssssssssssssssssssss

40 Character data field, right/left arrow keys will scroll data display if whole field will not fit on display. Code key can be used to toggle data to hex.

In the above and all following examples variable display information is portrayed as follows:

nnn	Decimal numeric data
hhh	Hexadecimal numeric data
sss	Alpha/numeric (string) data

26.2 TRANSMISSION HEADER DECODE FORMATS

Transmission Header types 0 and 1

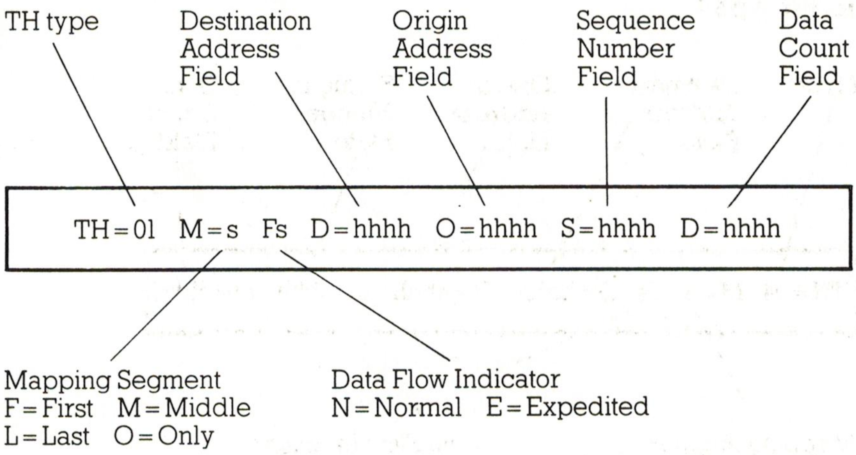


Fig. 19

Transmission Header type 2

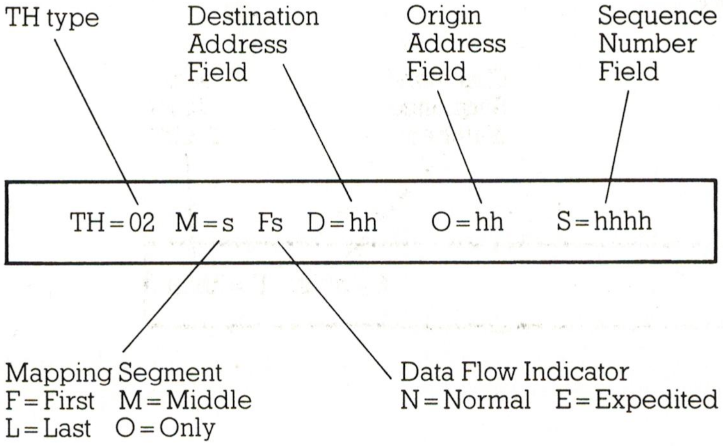
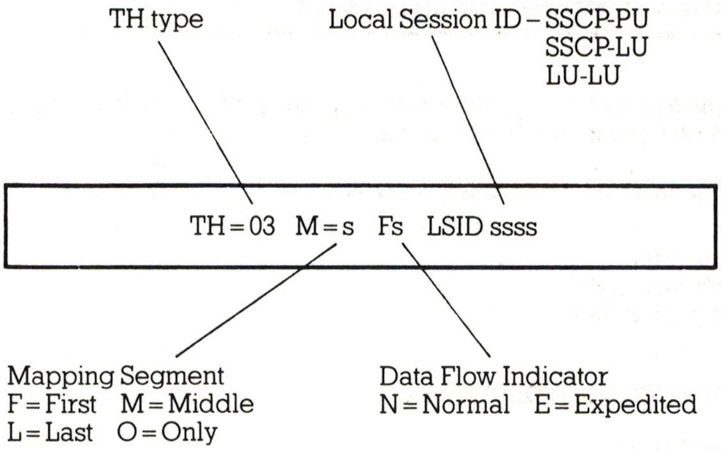


Fig. 20

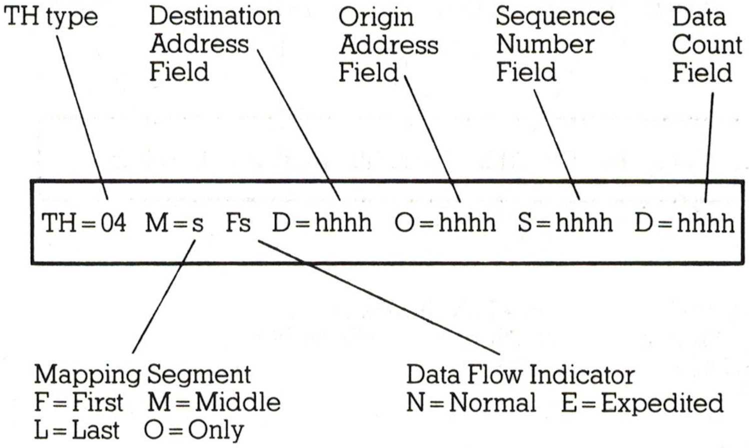
Transmission Header type 3

Fig. 21



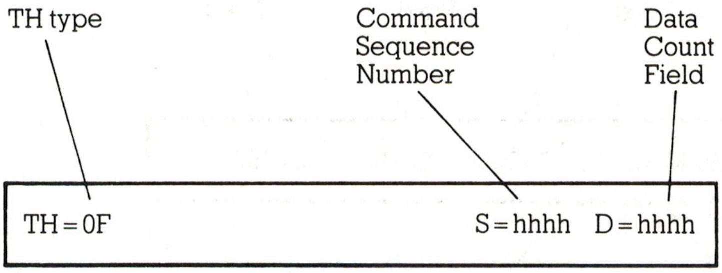
Transmission Header type 4

Fig. 22



Transmission Header type F

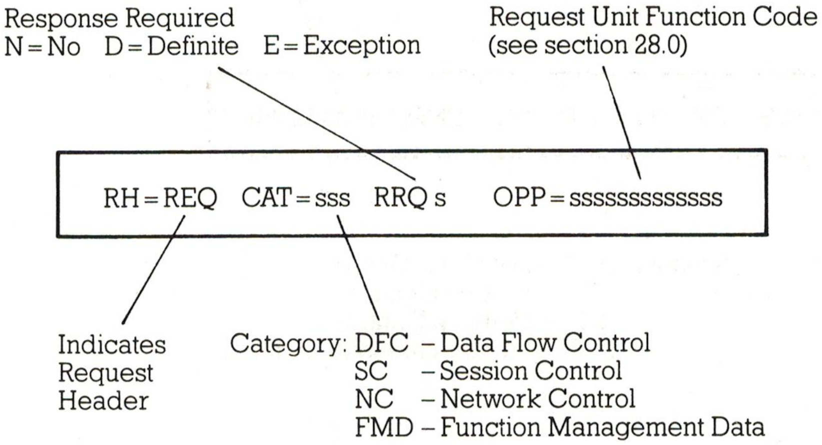
Fig. 23



26.3 REQUEST AND RESPONSE HEADER DECODE FORMATS

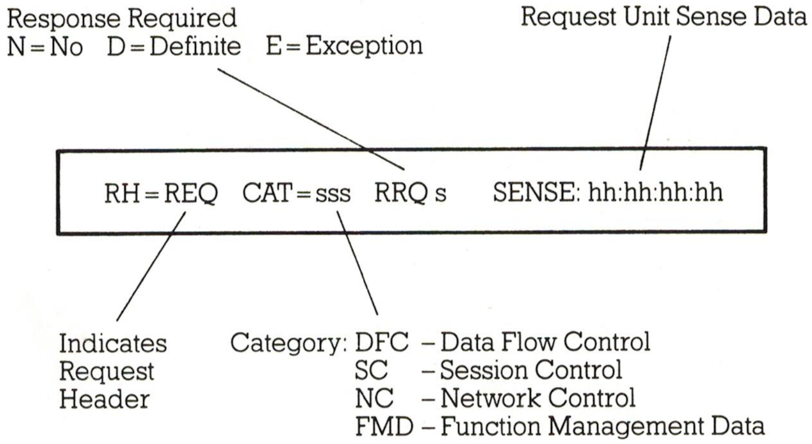
Request Header

Fig. 24


Response Required
N = No D = Definite E = Exception
Request Unit Function Code
(see section 28.0)
RH = REQ CAT = sss RRQ s OPP = ssssssssssss
Indicates
Request
Header
Category: DFC – Data Flow Control
SC – Session Control
NC – Network Control
FMD – Function Management Data

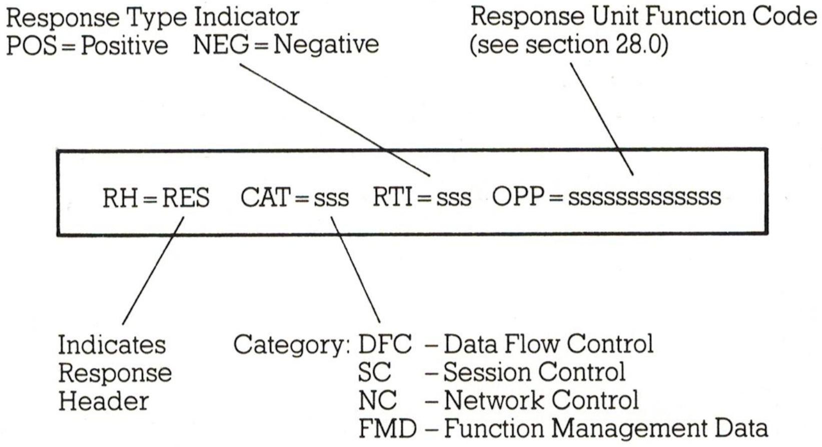
Request Header, Request Unit contains sense data

Fig. 25


Response Required
N = No D = Definite E = Exception
Request Unit Sense Data
RH = REQ CAT = sss RRQ s SENSE: hh:hh:hh:hh
Indicates
Request
Header
Category: DFC – Data Flow Control
SC – Session Control
NC – Network Control
FMD – Function Management Data

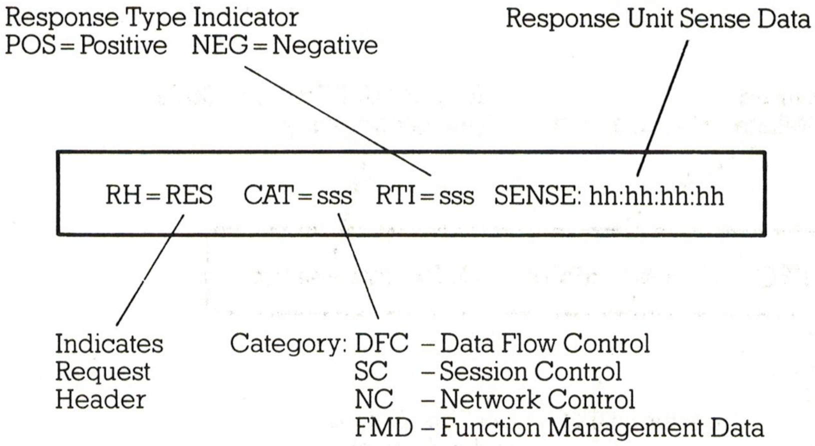
Response Header

Fig. 26


Response Type Indicator
POS = Positive NEG = Negative
Response Unit Function Code
(see section 28.0)
RH = RES CAT = sss RTI = sss OPP = ssssssssssss
Indicates
Response
Header
Category: DFC – Data Flow Control
SC – Session Control
NC – Network Control
FMD – Function Management Data

Response Header, Response Unit contains sense data

Fig. 27


Response Type Indicator
POS = Positive NEG = Negative
Response Unit Sense Data
RH = RES CAT = sss RTI = sss SENSE: hh:hh:hh:hh
Indicates Request Header
Category: DFC – Data Flow Control
SC – Session Control
NC – Network Control
FMD – Function Management Data

27.0 REQUEST/RESPONSE UNIT FUNCTION CODES

Data Flow Control (DFC)

MNEMONIC	**MEANING**	**USE**
LUSTAT	Logical Unit Status	Used by one half-session to send up 4 bytes of status information to its paired half-session.
RTR	Ready To Receive	Indicates to the bidder that it is now allowed to initiate a bracket.
BIS	Bracket Initiation Stopped	Sent by a half-session to indicate it will not attempt to begin any more brackets.
SBI	Stop Bracket Initiation	Sent by either h-s to request that the receiving h-s stop initiating brackets by continued sending of BB and the BID request.
QEC	Quiesce at End of Chain	Sent by h-s to quiesce its partner h-s after it finishes sending the current chain.
QC	Quiesce Complete	Sent by the h-s after receiving QEC.
RELQ	Release Quiesce	Used to release h-s from quiesced state.
CANCEL	Cancel	May be sent by an h-s to terminate a partially sent chain of FMD requests.
CHASE	Chase	Sent by the h-s to request the receiving h-s to return all outstanding responses.
RSHUTD	Request Shutdown	Sent from sec. to pri. to indicate that the sec. is ready to have the session deactivated.
SHUTC	Shutdown Complete	Sent by the pri. to indicate it is in a shutdown state.
SHUTD	Shutdown	Sent by the pri. to request the sec. to shutdown.
BID	Bid	Used by the bidder to request permission to initiate a bracket.
SIG	Signal	An expedited request that can be sent between h-s, regardless of the status of the normal flows.

Session Control (SC)

MNEMONIC	**MEANING**	**USE**
ACTLU	Activate Logical Unit	Sent from an SSCP to an LU to activate a session between the SSCP and LU.
DACTLU	Deactivate Logical Unit	Sent to deactivate the session between the SSCP and the PU.
ACTPU	Activate Physical Unit	Sent by the SSCP to activate a session with the PU.
DACTPU	Deactivate Physical Unit	Sent to deactivate the Unit session between the SSCP and the PU.
ACTCDRM	Activate Cross-Domain Resource Manager	Sent from SSCP to another SSCP to activate a session between them.
DACTCDRM	Deactivate Cross-Domain Resource Manager	Sent to deactivate an SSCP-SSCP session.

BIND	Bind Session	Sent from a pri. LU to a sec. LU to activate a session between the LUs.
UNBIND	Unbind Session	Sent to deactivate session between two LUs.
SDT	Start Data Traffic	Sent by pri. to sec. to enable both way FMD and DFC requests and responses.
CLEAR	Clear	Sent by pri. to reset the data traffic FSMs.
STSN	Set and Test Sequence Numbers	Sent by pri. h-s sync point manager to resync the values of the h-s sequence numbers.
RQR	Request Recovery	Sent by sec. to request the pri. to initiate recovery by sending CLEAR or to deactivate the session.
CRV	Cryptography Verification	Sent by the pri. to verify cryptography security.

Network Control (NC)

MNEMONIC	**MEANING**	**USE**
NC-IPL-FINAL	Nc IPL Final	Contains the entry point location of the IPL module.
NC-IPL-INIT	Nc IPL Initial	Sent from a T4/5 to a T2 after processing an INITPROC RU.
NC-IPL-TEXT	Nc IPL Text	Contains the IPL data.
LSA	Lost Subarea	Received from a node that does not support ER-VR protocols.
NC-ER-INOP	Explicit Route Inoperative	Initiated when the last remaining link of a transmission group has failed.
NC-ER-TEST	Explicit Route Test	Sent by a subarea node that requires testing of an explicit route to a specified dest. subarea.
NC-ER-TEST-RE	Explicit Route Test Reply	Returned to signal the success of NC-ER-TEST.
NC-ER-ACT	Explicit Route Activate	Sent by the ER manager in a subarea node in order to activate an explicit route.
NC-ER-ACT-REP	Explicit Route Activate Reply	Returned to signal the success of the NC-ER-ACT.
NC-ACTVR	Activate Virtual Route	Initialises a VR at each of its end nodes.
NC-DACTVR	Deactivate Virtual Route	Self explanatory.
ER-OP	Explicit Route Operative	Generated when a link of an inop tx group becomes operative.
NC-IPL-ABORT	Nc IPL Abort	Contains sense data containing reason for a failure during IPL.

Function Management Data

MNEMONIC	**MEANING**	**USE**
CONTACT	Contact	Requests the PU to activate DLC-level with the adjacent link station specified.
DISCONTACT	Discontact	Requests the PU to deactivate DLC-level contact with the specified node.
IPLINIT	IPL Initial	Initiates a DLC-level load of an adjacent PU T4 node.
IPLTEXT	IPL Text	Transfers DLC-level load module to PU.
IPLFINAL	IPL Final	Ends IPL sequence and supplies module entry point.
DUMPINIT	Dump Initial	Requests the T4 to initiate a DLC-level dump from an adjacent T4 node.
DUMPTEXT	Dump Text	Additional dump data.
DUMPFINAL	Dump Final	Terminates the dump sequence.
RPO	Remote Power Off	Causes the receiving PU to initiate a power off sequence.
ACTLINK	Activate Link	Initiates a procedure at the PU to activate the protocol boundary between a link station in the node and the link connection attached to it.
DACTLINK	Deactivate Link	Initiates a procedure at the PU to deactivate the protocol boundary between a link station in the node and the link connection attached to it.
ABCONN	Abandon Connection	Requests the PU to deactivate a specified link connection.
SETCV NS(c)	Set Control Vector	Sets a control vector that is maintained by the PU.
ESLOW	Entering Slowdown	Informs the SSCP that the node of sending PU has entered slow down state.
EXSLOW	Exiting Slowdown	Informs the SSCP that the node of the sending PU is no longer in slowdown.
ACTCONNIN	Activate Connect In	Requests PU to enable incoming calls.
DACTCONNIN	Deactivate Connect In	Requests the PU to disable the specified link form accepting incoming calls.
ABCONNOUT	Abandon Connect Out	Requests the PU to terminate a connect out procedure.
CONNOUT	Connect Out	Requests the PU to initiate a connect-out procedure.
ANA	Assign Network Address	Updates the path control routing table in the T4/T5 node.
FNA	Free Network Address	Sent from SSCP to PU to request removal of certain resource list entries and free up element addresses.
REQDISCONT	Request Discontact	PU requests the SSCP to start to discontact the sec.
CONTACTED	Contacted	Sent by PU to indicate to the SSCP the completion of the DLC contact procedure.

INOP	Inoperative	Sent by SSCP to PU to report a link-related connection failure.
REQCONT	Request Contact	Notifies SSCP that a connection with an adjacent sec. has been activated.
NS-LSA	NS Lost Subarea	Reports interruption of routing capability to a set of subareas.
EXECTEST	Execute Test	Requests the PU to activate the specified test type.
ACTTRACE	Activate Trace	Requests the PU to activate a specified type of trace.
DACTTRACE	Deactivate Trace	Requests the PU to deactivate a specified type of trace.
SETCV NS(ma)	Set Control Vector	Sets the intensive mode ($08) control vector that is maintained by the PU.
DISPSTOR	Display Storage	Requests the PU to send a RECSTOR RU.
RECSTOR	Record Storage	Carries the storage dump as requested by a DISPSTOR RU.
RECMS	Record Maintenance Statistics	Permits passing of maintenance stats. from a PU to a centralised recording facility at the SSCP.
RECTD	Record Test Data	Returns results of tests requested by EXECTEST.
RECTRD	Record Trade Data	Returns data collected during a trace.
NSPE	NS Procedure Error	Sent by SSCP to inform ILU or TLU of session init. or term. failure.
INIT-SELF 0	Initiate Self	Requests SSCP to assist in the initiation of a session between the requesting LU and another LU.
TERM-SELF 0	Terminate Self	From TLU requests SSCP to assist in the termination of one or more sessions.
RNAA	Request Network Addr. Assignment	Requests the PU to assign element addresses.
DELETENR	Delete Network Resource	Sent to free a network address assigned to a link or link station.
ER-INOP	Explicit Route Inoperative	Notifies the CP when an explicit has become inoperative.
ADDLINK	Add Link	Sent from SSCP to PU to obtain a link network address.
NOTIFY CP-PU	Notify	Used to synchronise awareness between SSCP and PU of the status of a cross-network session.
ADDLINKSTA	Add Link Station	Sent from SSCP to PU to obtain an adjacent link station network address.
VR-INOP	Virtual Route Inop.	Notifies the CP when a virtual route has become inoperative somewhere in the network.
INITPROC	Initiate Procedure	Sent to a PU to initiate a load operation.
PROCSTAT	Procedure Status	Reports to the SSCP status of a load operation.

LDREQD	Load Required	Enables PU to request a specific load module.
RECACTLU	Request Activate Logical Unit	Sent from PU to SSCP to request that ACTLU be sent to the named LU.
NS-IPL-INIT	NS IPL Initial	Sent to PU to indicate load module is about to be sent.
NS-IPL-TEXT	NS IPL Text	Contains the IPL data.
NS-IPL-FINAL	NS IPL Final	Contains the entry point for module execution.
NS-IPL-ABORT	NS IPL Abort	Indicates to the PU that load operation has been halted.
REQFNA	Request Free Network Address	Sent from PU to SSCP to request a free network address.
LCP	Lost Control Point	Notifies SSCP that a subarea PUs session with another SSCP has failed.
ROUTE-INOP	Route Inoperative	Notifies the CP if a virtual or explicit route has become inoperative.
REQACTCDRM	Request Activation of Cross-Network Resource Manager	Prompts the receiving SSCP to issue RNAA and SETCV.
REQMS	Request Maintenance Statistics	Requests the CNM services associated with the PU to provide maintenance stats.
TESTMODE	Test Mode	Requests the CNM services associated with the PU to manage a test procedure.
ROUTE-TEST	Route Test	Requests the PC-ROUTE-MGR component of PU.SVC-MGR to return status of various explicit or virtual routes.
RECFMS	Record Formatted Maintenance Stats.	Passes maintenance info from PU to maint. services at the SSCP.
RECTR	Record Test Results	Returns Results and status of a test.
ER-TESTED	Explicit Route Tested	Sent by subarea node to one or more SSCPs to provide ER status.
NMVT	Network Management Vector Transport	Carries MS requests between control point and a PU.
REQECHO	Request Echo Test	Requests the SSCP to return the data included in REQECHO in ECHOTEST.
ECHOTEST	Echo Test	Carries test data to the target LU.
CINIT	Control Initiate	Requests the PLU to activate via a BIND request a session with the specified SLU.
CTERM	Control Terminate	Requests the PLU to attempt to deactivate a session identified by the specified PLU, SLU network address pair.
NOTIFY CP-LU	Notify	Sends information from SSCP-LU in the form of a vector key, vector data pair.
CLEANUP	Clean Up Session	Sent by the SSCP to LU requesting LU to deactivate session between PLU, SLU network address pair.
INIT-OTHER	Initiate Other	From ILU requests initiation of a session between the two named LUs.

INIT-SELF 1	Initiate Self	Requests SSCP to assist in initiation of a session between LU sending request and another LU.
TERM-OTHER	Terminate Other	From TLU requests SSCP to assist in terminating sessions between two specified LUs.
TERM-SELF 1	Terminate Self	From TLU requests SSCP to assist in termination of one or more sessions.
BINDF	Bind Failure	Sent by PLU to notify SSCP that an attempt to activate a session between the specified LUs has failed.
SESSST	Session Started	Sent by LU to SSCP to notify that session between two specified LUs has started.
UNBINDF	Unbind Failure	Sent by PLU to notify SSCP that a deactivate session between two LUs has failed.
SESSEND	Session Ended	Sent by LU to SSCP to notify that session between two specified LUs has ended.
NOTIFY CP-CP	Notify	Used to send information from an SSCP to another SSCP.
DSRLST	Direct Search List	Identifies control list type and specifies a list search argument.
INIT-OTHER-CD	Initiate Other Cross-Domain	Requests that a session be initiated between the two LUs named in the RU.
CDINIT	Cross-Domain Control Initiate	Passes information about the SLU from the SSCP (SLU) to the SSCP (PLU).
CDTERM	Cross-Domain Terminate	Requests SSCP (DLU) to assist in the termination of the cross-domain LU-LU session.
CDSESSSF	Cross-Domain Session Setup Failure	Notifies the SSCP that the LU-LU session initiation has failed.
CDSESSST	Cross-Domain Session Started	Notifies the SSCP that the LU-LU session has successfully started.
CDSESSTF	Cross-Domain Session Takedown Failure	Notifies the SSCP that the LU-LU session takedown has failed.
CDSESSEND	Cross-Domain Session Ended	Notifies the SSCP that the LU-LU session has been deactivated.
CDTAKED	Cross-Domain Takedown	Initiates a procedure to take down all cross-domain LU-LU sessions.
CDTAKEDC	Cross-Domain Takedown Complete	Sent on completion of cross-domain takedown.
CDCINIT	Cross-Domain Initiate	Requests the SSCP (DLU) to assit in initiating the LU-LU session for the specified OLU, DLU pair.

28.0 PRINTING DECODED FRAMES

It is possible to send all HDLC or SDLC frames held in the capture buffer to a printer, either serial or parallel (Centronics), in the decoded format.

The output is of a similar format to that of the frame decode as displayed on the LCD, but all levels of decode and data can be printed together.

To initiate printing, key the 'dump' key while in either level 2 or level 3 decode mode, the Fakerscope will respond with:

```
FAKERSCOPE 2500 – CAPTURED FRAME DUMP
CENTRONICS OR SERIAL? (KEY C or S)
```

Now key either C or S, depending on the type of printer you are using.

All frames held in the capture buffer will now be decoded and printed.

Note the decode level on the printout will reflect the decode level selected for review mode, either frame (level 2) or frame and packet (level 3).

If serial mode is selected the data will be transmitted in whatever format is set in the currently loaded setup menu, only defaulting to asynchronous.

```
FAKERSCOPE 2500 – CAPTURED FRAME DUMP      Revision 3.3E
LEVEL 2 DECODE = SDLC
LEVEL 3 DECODE = SNA

 ----- LEVEL 2 FRAME DECODE -----        ----- LEVEL 3 FRAME DECODE -----

DCE A  CMD/RES  N(R)  N(S)  P  FCS       SNA> TH=04 M=M FN D=8080 O=8080 S=8080 D=8080
000 41  INFO      2     1   0  G              RH=RES  CAT=FMD  RTI=POS
DATA: 43 44 F1 20 00 20 20 20 20 20 20 20 20 20 20 20     CDq

DCE A  CMD/RES  N(R)  N(S)  P  FCS       SNA> TH=04 M=M FN D=8080 O=8080 S=8080 D=8080
999 41  INFO      2     1   0  G              RH=RES  CAT=FMD  RTI=POS
DATA: 43 44 F1 10 00 20 20 20 20 20 20 20 20 20 20 20     CDq

DCE A  CMD/RES  N(R)  N(S)  P  FCS       SNA> TH=04 M=M FE D=4344 O=F120 S=0006 D=1680
998 41  INFO      2     1   0  G              RH=RES  CAT=FMD  RTI=POS
DATA: 43 44 F1 00 00 20 20 20 20 20 20 20 20 20 20 20     CDq

DCE A  CMD/RES  N(R)  N(S)  P  FCS       SNA> TH=02 M=M FN D=31 O=31 S=3131
997 41  INFO      2     1   0  G              RH=REQ  CAT=FMD  RRQ  N  OPP=CONTACT
DATA: 20 31 31 31 31 31 08 00 00 01 02 01 41 41 41 20     1111....AAA
```

Fig. 28 Sample decoded frame dump (SDLC)

```
FAKERSCOPE 2500 – CAPTURED FRAME DUMP      Revision 3.3E
LEVEL 2 DECODE = HDLC
LEVEL 3 DECODE = X-25

 ----- LEVEL 2 FRAME DECODE -----        ----- LEVEL 3 FRAME DECODE -----

DCE A  CMD/RES  N(R)  N(S)  P  FCS             X-25> Q=0 D=1 LCN=344 TYPE=DIAGNOSTIC
000 41  INFO      2     1   0  G                     CAUSE: IPT   DIAGNOSTIC CODE: 00

DCE A  CMD/RES  N(R)  N(S)  P  FCS             X-25> Q=0 D=1 LCN=344 TYPE=DIAGNOSTIC
999 41  INFO      2     1   0  G                     CAUSE: ???? 00 DIAGNOSTIC CODE: 00

DCE A  CMD/RES  N(R)  N(S)  P  FCS             X-25> Q=0 D=0 LCN=031 TYPE=RR
998 41  INFO      2     1   0  G                     P(R) 024

DCE A  CMD/RES  N(R)  N(S)  P  FCS             X-25> Q=0 D=1 LCN=041 TYPE=RR
997 41  INFO      2     1   0  G                     P(R) 2
```

Fig. 29 Sample decoded frame dump (HDLC)

29.0 HDLC/X-25 FRAME TYPE COUNTING FUNCTION

When the Fakerscope is configured in high speed monitor mode a frame type counting function is available.

Whenever the Fakerscope is acquiring HDLC or SDLC data in the H.S. monitor mode the following frame types will be recognised and counted, both for DCE and DTE:

At level 2 (link level) HDLC or SDLC	Number of INFO frames Number of REJ frames Number of FRMR frames
At level 3 (packet level) X-25 only	Number of DATA packets Number of CALL REQUEST packets Number of CALL ACCEPT packets Number of RESET REQUEST packets Number of REJECT packets

The Values of all the above counters can be viewed either while in acquire mode or while the Fakerscope is idle by using the status key. When in high speed mode the status key will display the value of the DCE or DTE counters instead of the transmit status, the two counter status displays will appear as follows:

Number of L2 Info Frames

Number of L2 Frame Reject Frames

Number of L2 Reject Frames

Fig. 32

```
L2:  INFO=nnnn   FRMR=nn   REJ=nn            (DCE)
L3:  DATA=nnnn   CR=nn   CA=nn   RSR=nn   REJ=nn
```

Number of X-25 Rejects

Number of X-25 Data Frames

Number of X-25 Call Requests

Number of X-25 Call Accepts

Number of X-25 Reset Requests

Frame Counter display for DCE accessed by status key

Fig. 33

```
L2:  INFO=nnnn   FRMR=nn   REJ=nn            (DTE)
L3:  DATA=nnnn   CR=nn   CA=nn   RSR=nn   REJ=nn
```

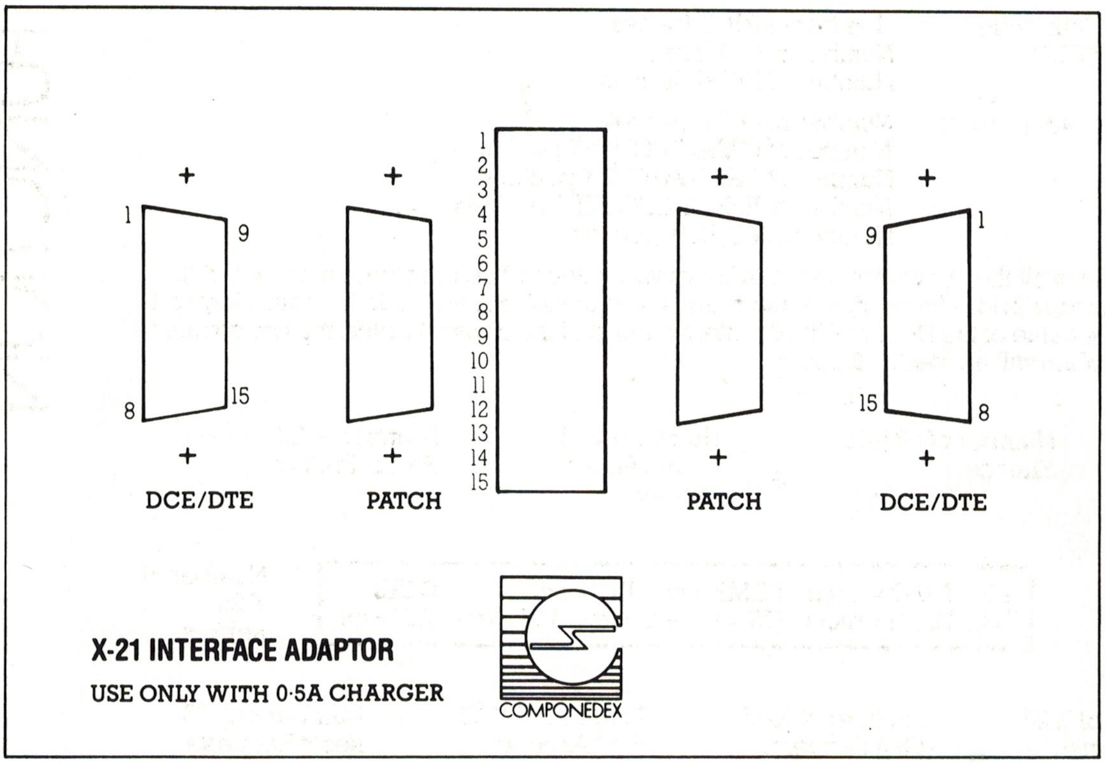
Frame counter display for DTE accessed by status key

30.0

COMPONEDEX X-20/X-21 INTERFACE ADAPTOR INSTRUCTIONS FOR USE

The Componedex X-20/X-21 interface adaptor is intended to allow the Componedex Fakerscope to be used in an X-21 or X-20 environment in either monitor or simulate mode.

The figure below shows the basic layout of the unit.



All 15 lines from the DCE/DTE connectors at either end of the adaptor are passed through the unit.

All 15 lines pass through the break switches, enabling signals to be broken and cross patched.

Not all the X-21 signals pass into the Fakerscope itself, the table below shows the signals which connect to the Fakerscope unit and their sense, i.e. whether they are an output from or input to the Fakerscope.

The table also shows the mnemonic displayed on the Fakerscope signal display which represents the signal concerned.

SIGNAL	SENSE WITH RESPECT TO FAKERSCOPE V. OPERATIONAL MODE				
		MONITOR ONLY	TX ON 2	TX ON 3	DISPLAYED MNEMONIC
T		input	output	input	TXD
R		input	input	output	RXD
C		input	input	input	DTR
I		input	input	input	CTS
S		input	input	input	TXC and RXC
B		Not connected to Fakerscope			

Table 1.

The Fakerscope interface state display LCD will only give a valid indication of the state of the signals listed on table 1 providing that a proper X-21 or X-20 signal is present on the interface, unconnected signals will give an unpredictable display.

At various points in the Fakerscope setups, where pin 2 or pin 3 are referred to, i.e. transmit status TX-2 or TX-3, this translates to T and R respectively when using the X-20/X-21 interface.

CONVERTING FROM X-21 TO X-20

To convert the interface adaptor from X-21 operation to X-20, remove the PCB from the case, break all solder links marked 'L21' and put in all solder links marked 'L20'.

To convert from X-20 to X-21 is the reverse of the above.

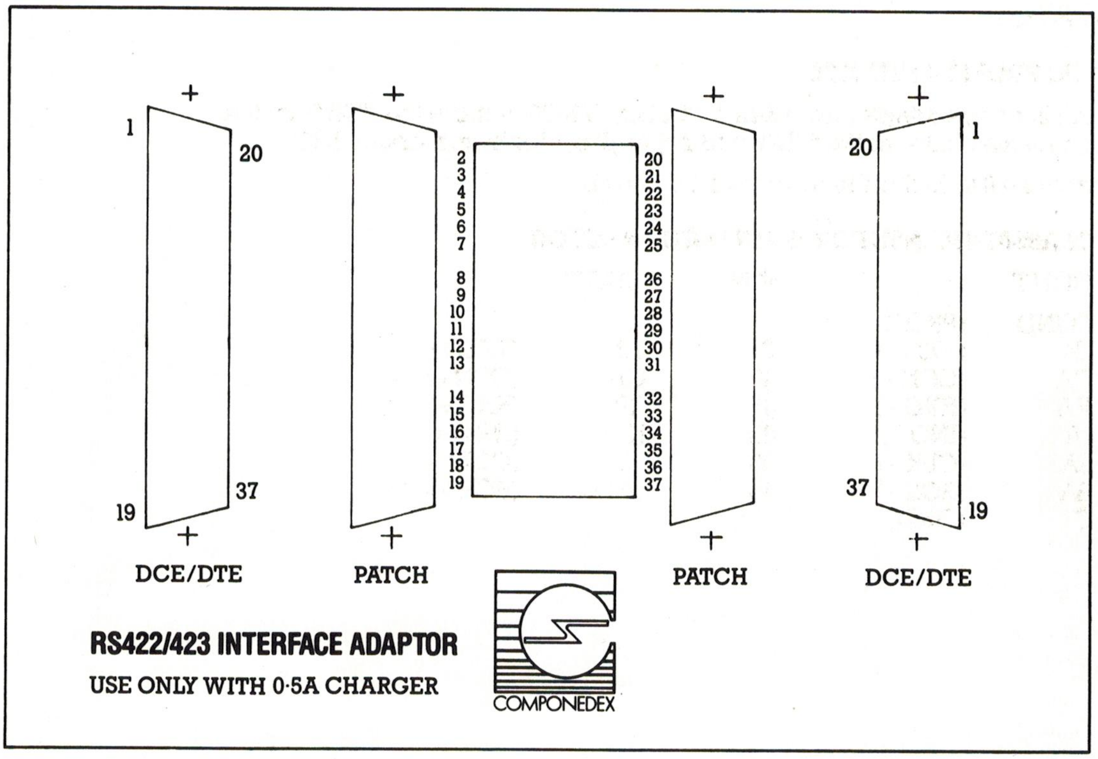
ISO 4903 PIN ASSIGNMENTS FOR 15 PIN D-CONNECTOR

PIN	CCITT		PIN	CCITT	
1	PGND	(PROT)			
2	TA	(TXD−)	9	TB	(TXD+)
3	CA	(CON−)	10	CB	(CON+)
4	RA	(RXD−)	11	RB	(RXD+)
5	IA	(IND−)	12	IB	(IND+)
6	SA	(CLK−)	13	SB	(CLK+)
7	BA	(BCK−)	14	BB	(BCK+)
8	G	(GND)			

31.0 COMPONEDEX RS422/423 INTERFACE ADAPTOR INSTRUCTIONS FOR USE

The Componedex RS422/423 interface adaptor is intended to allow the Componedex Fakerscope 2500 to be used in an RS422 or RS423 environment in either monitor or simulate mode.

The figure below shows the basic layout of the unit.



All 37 lines from the DCE/DTE connectors at either end of the adaptor are passed through the unit.

Lines 2 to 37 pass through the break switches, enabling signals to be broken and cross patched.

Not all the RS422 signals pass into the Fakerscope 2500 itself, the table below shows the signals which connect to the Fakerscope unit and their sense, i.e. whether they are an output from or input to the Fakerscope.

SIGNAL	SENSE WITH RESPECT TO FAKERSCOPE V. OPERATIONAL MODE					
		MONITOR ONLY	TX ON 2	TX ON 3	INT/EXT CLK	SOURCE CLK
TXD		input	output	input		
RXD		input	input	output		
RTS		input	output	output		
CTS		input	input	input		
DTR		input	input	input		
TXC					input	output
RXC					input	output

Table 1.

The Fakerscope interface state display LCD will only give a valid indication of the state of the signals listed on table 1 providing that a proper RS422 or 423 signal is present on the interface, unconnected signals will give an unpredictable display.

At various points in the Fakerscope setups, where pin 2 or pin 3 are referred to, i.e. transmit status TX-2 or TX-3, this translates to TXD and RXD respectively when using the RS422/423 interface.

CONVERTING FROM RS422 TO RS423

To convert the interface adaptor from RS422 operation to RS423, remove the PCB from the case, break all solder links marked 'L2' and put in all solder links marked 'L3'.

To convert from RS423 to RS422 is the reverse of the above.

ISO 4902 PIN ASSIGNMENTS FOR 37 PIN D-CONNECTOR

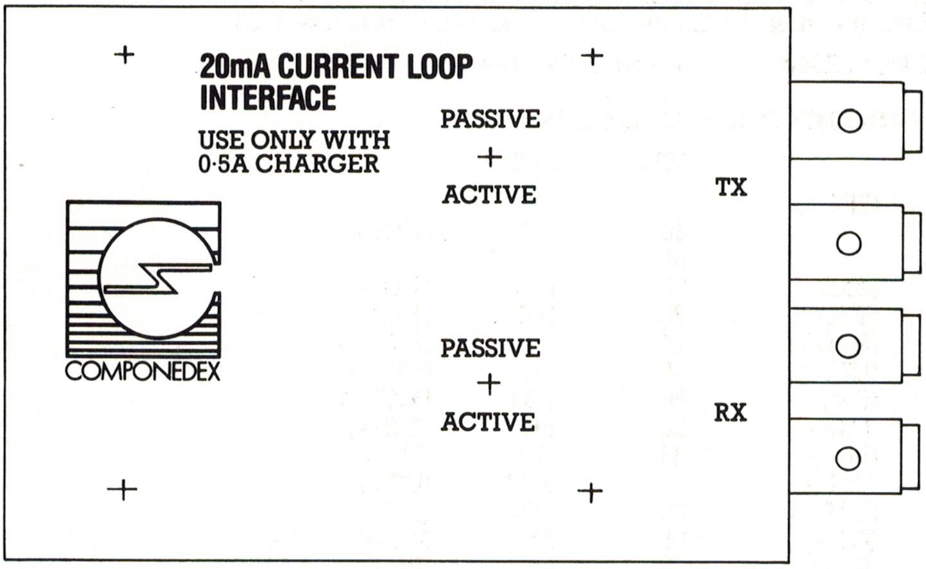
PIN	CCITT		PIN	CCITT	
1	101	(PROT)			
2			20	102	(GND)
3			21		
4	103A	(TXD−)	22	103B	(TXD+)
5	114A	(TXC−)	23	114B	(TXC+)
6	104A	(RXD−)	24	104B	(RXD+)
7	105A	(RTS−)	25	105B	(RTS+)
8	115A	(RXC−)	26	115B	(RXC+)
9	106A	(CTS−)	27	106B	(CTS+)
10	141A	(LL−)	28	141B	(LL+)
11	107A	(DSR−)	29	107B	(DSR+)
12	108A	(DTR−)	30	108B	(DTR+)
13	109A	(CD−)	31	109B	(CD+)
14	140A	(RL−)	32	140B	(RL+)
15	125A	(RI−)	33	125B	(RI+)
16	111A	(DRS−)	34	111B	(DRS+)
17	113A	(txc−)	35	113B	(txc+)
18	142A	(TI−)	36	142B	(TI+)
19	102	(GND)	37	102	(GND)

32.0 COMPONEDEX 20mA CURRENT LOOP INTERFACE ADAPTOR INSTRUCTIONS FOR USE

The Componedex 20mA current loop adaptor provides 20mA current loop conversion for the Fakerscope Transmit data and Receive data connections.

Each circuit provided by the adaptor can be configured as a receiver or driver, enabling the Fakerscope to monitor or operate in simulate mode on either circuit. In addition, either or both circuits can be configured to be active or passive, whether working in monitor (input) or simulate (output) modes.

The figure below shows the basic layout of the unit.



NOTE: The current generators/receivers in the adaptor are not totally isolated circuits. Therefore, if both the TX and RX circuits are used in the same system, e.g. if connected to both sides of a full duplex link, then at least one of the circuits must have an isolated receiver to prevent the adaptor causing interaction between the TX and RX circuits.

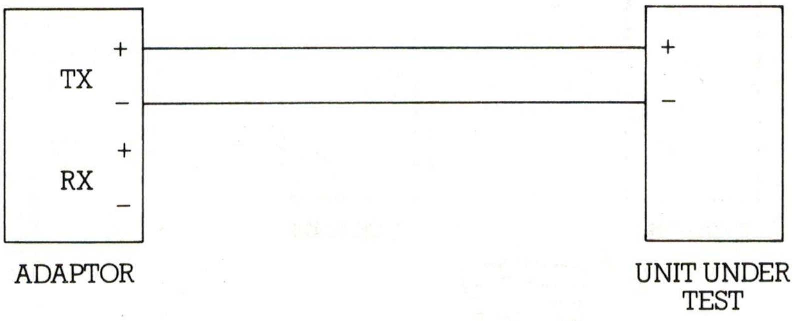
For this reason it is not possible to loop TX back to RX on the adaptor unit.

The diagram below shows the basic connection of the adaptor into a system under test for SIMULATE modes, i.e. for sending data directly to or receiving data directly from the system under test.

The interface adaptor can be set to active or passive, determined by the configuration of the device under test. If the device under test is ACTIVE, then the Fakerscope adaptor must be set to PASSIVE and vice-versa.

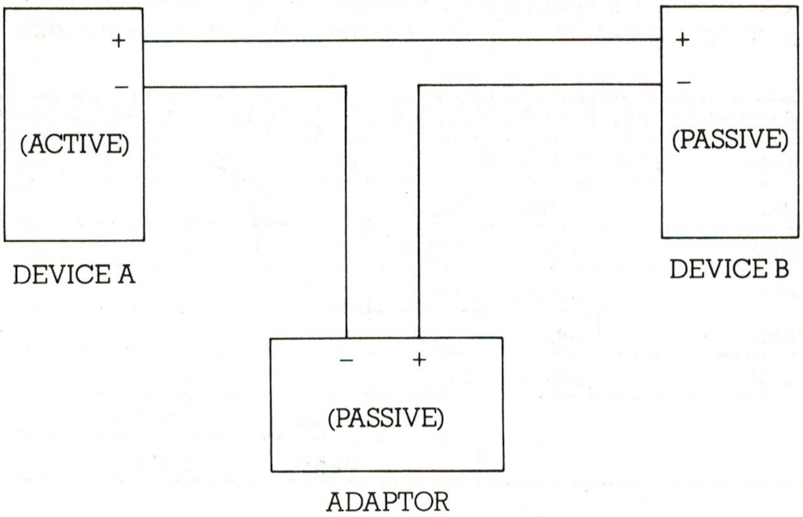
In the configuration shown, either the TX or RX pair of terminals can be used, resulting in the monitored data being displayed on the upper (TX) or lower (RX) lines of the Fakerscope display.

If the configuration shown is used to send data to the device under test then the Fakerscope must be set to TX-PIN 2 if using the TX pair or if using the RX pair, TX-PIN 3.



If using the adaptor to monitor data on a link between two devices then the interface adaptor connections are shown below.

The adaptor must be set to PASSIVE if monitoring data flow between two connected devices as shown.

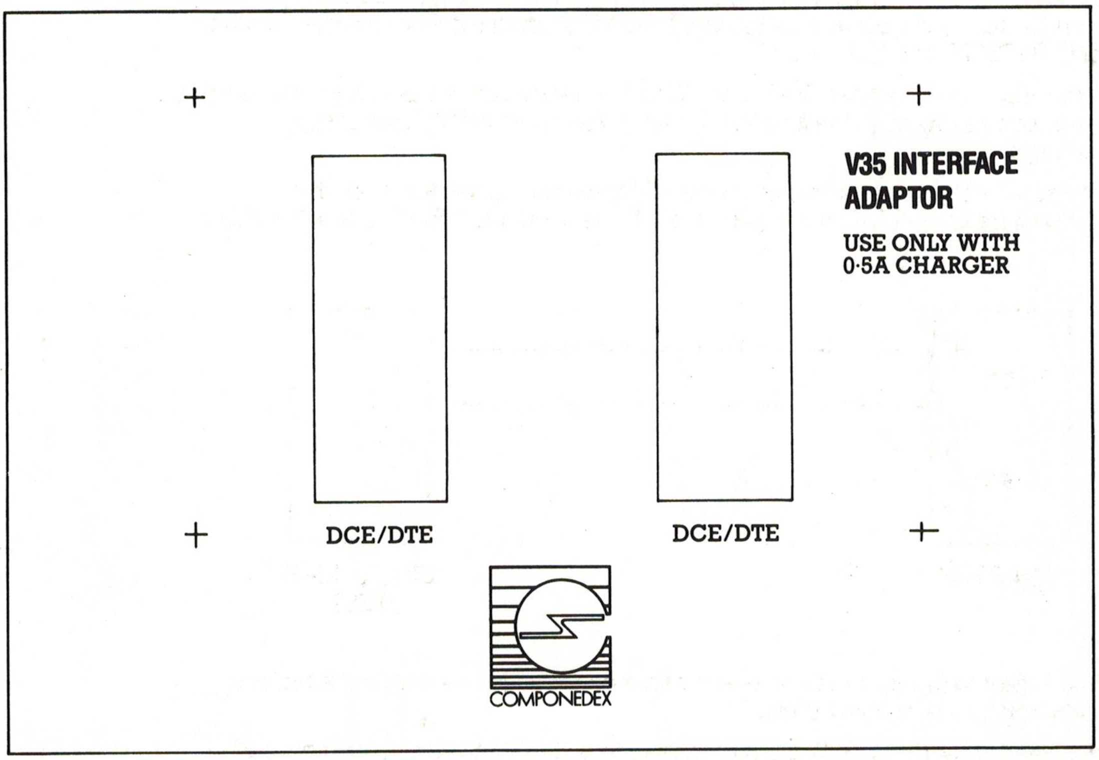


33.0

COMPONEDEX V.35 INTERFACE ADAPTOR INSTRUCTIONS FOR USE

The Componedex V.35 interface adaptor is intended to allow the Componedex Fakerscope to be used in a V.35 environment in either monitor or simulate mode.

The figure below shows the basic layout of the unit.



All 18 signal lines from the DCE/DTE connectors at either end of the adaptor are passed through the unit.

Not all the V.35 signals pass into the Fakerscope itself, the table below shows the signals which connect to the Fakerscope unit and their sense, i.e. whether they are an output from or input to the Fakerscope.

SIGNAL	SENSE WITH RESPECT TO FAKERSCOPE V. OPERATIONAL MODE					
		MONITOR ONLY	TX ON 2	TX ON 3	INT/EXT CLK	SOURCE CLK
TXD		input	output	input		
RXD		input	input	output		
RTS		input	output	output		
CTS		input	input	input		
DTR		input	input	input		
TXC					input	output
RXC					input	output

Table 1.

The Fakerscope interface state display LCD will only give a valid indication of the state of the signals listed on table 1 providing that a proper V.35 signal is present on the interface, unconnected signals will give an unpredictable display.

At various points in the Fakerscope setups, where pin 2 or pin 3 are referred to, i.e. transmit status TX-2 or TX-3, this translates to TXD and RXD respectively when using the V.35 interface.

ISO 2593 PIN ASSIGNMENTS FOR 34 PIN MRAC CONNECTOR

PIN	CCITT		PIN	CCITT	
A	PGND	(PROT)	B	101	(GND)
P	103A	(TXD−)	S	103B	(TXD+)
R	104A	(RXD−)	T	104B	(RXD+)
Y	114A	(TXC−)	AA	114B	(TXC+)
V	115A	(RXC−)	X	115B	(RXC+)
U	113A	(txc−)	W	113B	(txc+)
C	105	(RTS)	D	106	(CTS)
E	107	(DSR)	F	109	(CD)
H	108	(DTR)	J	125	(RI)

02 hex

SYMBOLS, ASCII and EBCDIC CONTROL MNEMONICS and HEX CODE

SYMBOL	MNEMONIC	DEFINITION	ASCII CODE	EBCDIC CODE	SYMBOL	MNEMONIC	DEFINITION	ASCII CODE	EBCDIC CODE
⬚	NUL	NULL	00	00	⏚	EM	END OF MEDIA	19	19
SH	SOH	START OF HEADER	01	01	Sb	SUB	SUBSTITUTE	1A	3F
SX	STX	START OF TEXT	02	02	ES	ESC	ESCAPE	1B	27
EX	ETX	END OF TEXT	03	03	◷	FS	FRAME SEPARATOR	1C	22
ET	EOT	END OF TRANSMISSION	04	37	◶	GS	GROUP SEPARATOR	1D	1D
Eq	ENQ	ENQUIRE	05	2D	◵	RS	RECORD SEPARATOR	1E	35
✓	ACK	ACKNOWLEDGE	06	2E	◴	US	UNIT SEPARATOR	1F	1F
⍾	BEL	BELL	07	2F	PF	PF			04
←	BS	BACK SPACE	08	16	LC	LC			06
HT	HT	HORIZONTAL TAB	09	05	⁙	RLF			09
≡	LF	LINE FEED	0A	25	S≡	SMM			0A
VT	VT	VERTICAL TAB	0B	0B	RE	RES			14
FF	FF	FORM FEED	0C	0C	nL	NL	NEW LINE		15
↵	CR	CARRIAGE RETURN	0D	0D	IL	IL			17
SO	SO	SHIFT OUT	0E	0E	CC	CC			1A
SI	SI	SHIFT IN	0F	0F	TS	TS			1C
dL	DLE	DATA LINK ESCAPE	10	10	dS	DS			20
⊡	DC1	DEVICE CONTROL 1	11	11	bp	BYP			24
⊡	DC2	DEVICE CONTROL 2	12	12	S-	SM			2A
⊡	DC3	DEVICE CONTROL 3	13	13	Pn	PN			34
⊡	DC4	DEVICE CONTROL 4	14	3C	UC	UC			36
✗	NAK	NEGATIVE ACKNOWLEDGEMENT	15	3D	⎍	DEL	DELETE	7F	07
Sy	SYN	SYNCHRONIZE	16	32	LI		LINE IDLE (SYNC ONLY)	FF	FF
Eb	ETB	END OF TEXT BLOCK	17	26	◇		UNDEFINED CHARACTER		
Cn	CAN	CANCEL	18	18	][	EOF	END OF FRAME (SDLC ONLY)		

APPENDIX 2

Hex-ASCII Conversion Chart

1st HEX DIGIT	2nd HEX DIGIT															
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**A**	**B**	**C**	**D**	**E**	**F**
0	NUL	SOH	STX	ETX	EOT	ENQ	ACK	BEL	BS	HT	LF	VT	FF	CR	SO	SI
1	DLE	DC1	DC2	DC3	DC4	NAK	SYN	ETB	CAN	EM	SUB	ESC	FS	GS	RS	US
2	SP	!	"	#	$	%	&	'	(	)	*	+	,	-	.	/
3	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
4	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
5	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	–
6	\	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
7	p	q	r	s	t	u	v	w	x	y	z	{	¦	}	→	DEL

APPENDIX 3

Hex-EBCDIC Conversion Chart

1st HEX DIGIT	2nd HEX DIGIT															
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**A**	**B**	**C**	**D**	**E**	**F**
0	NUL	SOH	STX	ETX	PF	HT	LC	DEL		RLF	SMM	VT	FF	CR	SO	SI
1	DLE	DC1	DC2	DC3	RES	NL	BS	IL	CAN	EM	CC		IFS	IGS	IRS	IUS
2	DS	SOS	FS		BYP	LF	ETB	ESC			SM			ENQ	ACK	BEL
3			SYN		PN	RS	UC	EOT					DC4	NAK		SUB
4	SP										¢		<	(	+	|
5	&										!	$	*	)	;	┐
6	-	/									¦	,	%	–	>	?
7											:	#	@	'	=	"
8		a	b	c	d	e	f	g	h	i						
9		j	k	l	m	n	o	p	q	r						
A	~		s	t	u	v	w	x	y	z						
B																
C	{	A	B	C	D	E	F	G	H	I						
D	}	J	K	L	M	N	O	P	Q	R						
E	\		S	T	U	V	W	X	Y	Z						
F	0	1	2	3	4	5	6	7	8	9						

APPENDIX 4

HEX-BAUDOT CONVERSION TABLE

Lower Case (Letters Shift)

1st HEX DIGIT	2nd HEX DIGIT															
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**A**	**B**	**C**	**D**	**E**	**F**
0	NUL	E	LF	A	SP	S	I	U	CR	D	R	J	N	F	C	K
1	T	Z	L	W	H	Y	P	Q	O	B	G	UC	M	X	V	LC

Upper Case (Figures Shift, CCITT 2)

1st HEX DIGIT	2nd HEX DIGIT															
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**A**	**B**	**C**	**D**	**E**	**F**
0	NUL	3	LF	-	SP	'	8	7	CR	$	4	BEL	,	!	:	(
1	5	+	)	2	#	6	0	1	9	?	&	UC	.	/	=	LC

APPENDIX 5

HEX – CORRESPONDENCE CONVERSION TABLE

LOWER CASE

1st HEX DIGIT	2nd HEX DIGIT															
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**A**	**B**	**C**	**D**	**E**	**F**
0	SP	!	t	j	4	o	l	/	5	'	e	p				
1	2	.	n	=	z				6	i	k	q	UC	BS	EOTB	LC
2	1	m	x	g	0	s	h	y	7	r	d	;		CR	LF	HT
3	3	v	u	f	9	w	b	-	8	a	c	,	EOT			

UPPER CASE

1st HEX DIGIT	2nd HEX DIGIT															
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**A**	**B**	**C**	**D**	**E**	**F**
0	SP		T	J	$	O	L	?	%	"	E	P				
1	@	.	N	+	Z				¢	I	K	Q	UC	BS	EOTB	LC
2		M	X	G	)	S	H	Y	&	R	D	:		CR	LF	HT
3	#	V	U	F	(	W	B	–	*	A	C	,	EOT			

APPENDIX 6

HEX-IPARS CONVERSION TABLE

1st HEX DIGIT	2nd HEX DIGIT															
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**A**	**B**	**C**	**D**	**E**	**F**
0	00	1	2	3	4	5	6	7	8	9	0	★	OC	EM	=	OF
1	01	/	S	T	U	V	W	X	Y	Z	–	#		EM	IE	,
2	@	J	K	L	M	N	O	P	Q	R	:	<	+	EM	)	(
3	$	A	B	C	D	E	F	G	H	I	?	.	%	EM	SY	SY

APPENDIX 7

HEX-EBCD CONVERSION TABLE

1st HEX DIGIT	2nd HEX DIGIT															
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**A**	**B**	**C**	**D**	**E**	**F**
0	SP	–	@	&	8	q	y	h	4	m	u	d				
1	2	k	s	b	0				6	o	w	f	SO	BS	EB	SI
2	1	j	/	a	9	r	z	i	5	n	v	e		CR	LF	HT
3	3	l	t	c	#	$	,	.	7	p	x	g	ET			
4	SP	–	@	&	8	q	y	h	4	m	u	d				
5	2	k	s	b	0				6	o	w	f	SO	BS	EB	SI
6	1	j	/	a	9	r	z	i	5	n	v	e		CR	LF	HT
7	3	l	t	c	#	$	,	.	7	p	x	g	ET			
8	SP	–		+	*	Q	Y	H	:	M	U	D				
9	<	K	S	B	)				'	O	W	F	SO	BS	EB	SI
A	=	J	?	A	(	R	Z	I	%	N	V	E		CR	LF	HT
B	;	L	T	C	"	!	'		>	P	X	G	ET			
C	SP	–		+	*	Q	Y	H	:	M	U	D				
D	<	K	S	B	)				'	O	W	F	SO	BS	EB	SI
E	=	J	?	A	(	R	Z	I	%	N	V	E		CR	LF	HT
F	;	L	T	C	"	!	'		>	P	X	G	ET			

Section B : Non-Warranty repairs

1. This section shall apply to products sold by RS which are not eligible for claims under Guarantee whether by reason of the time which has elapsed since purchase/repair or for some other reason.

2. RS will not accept a product for repair unless : -

   (a) The questionnaire (overleaf) has been fully completed (including the symptoms of the fault) and is enclosed with the product.
   (b) Any **RS** product serialisation label on the product has not been removed or made illegible.
   (c) The product has suffered neither excessive physical nor electrical damage and is free from modifications other than such modifications as may be detailed in the literature supplied with the product.

3. RS do not repair items added to products.

4. Work carried out and goods supplied under this repair service are subject to the Servicing Conditions contained in the **RS** catalogue current at the date the repaired or substitute product is despatched by RS.

Carriage

1. These provisions apply to products sent to RS under either Section A or Section B.

2. If the original packing is not available, then adequate packaging must be used.

3. Prior to despatch, please phone RS Servicepoint on 01536 - 405545. This will allow the item to be booked onto the Servicepoint system and for collection of the item to be arranged.

4. RS will bear the cost of returning or sending products to customers under Section A or Section B.

5. The product must be returned to RS Servicepoint, Venture Close, Lammas Rd, Corby, Northants. NN17 5UB.

PLEASE REFER TO ANY LITERATURE SUPPLIED WITH THIS PRODUCT AND ENSURE THAT THE CORRECT OPERATING PROCEDURES FOR THIS PRODUCT ARE ALWAYS FOLLOWED.

RS Components Issued February 1995 5775

REPAIR QUESTIONNAIRE

IMPORTANT

For the provisions governing the return of this product to RS Components Ltd, please read the details enclosed.

Please complete the following in the event of returning the product to RS.
The product must be sent to : RS Servicepoint, Venture Close, Lammas Road, Corby, Northants. NN17 5UB.

Your Delivery Point Code ☐☐☐☐ - ☐☐☐☐

Company Trading Title ____________________

Contact Name. Title ______ Initials ______ Surname ____________

Job Title (Department) ____________________

Telephone No. ____________________ Extension __________

Delivery Address (For the return of the product) ____________

____

____ Post Code __________

FOR CLAIMS UNDER WARRANTY ONLY

Order No. ____________________

Date of Supply / Repair ____________

Invoice No. ____________________

OUT OF WARRANTY

Order No. ____________________

Cheque Enclosed £ ____________
(If cash A/C)

Continued overleaf

PRODUCT DETAILS

Product Description : ____________________

RS Stock No. (If Known) : ____________________

Serial Number : ____________________

Symptoms of the fault :

....

....

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....

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....

Detail any accessories used with the product :

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Please complete and enclose this questionnaire with the product before despatch.

✂

REPAIR OF THIS PRODUCT

IMPORTANT

We recommend that customers retain the original packaging for storage in the event of having to return the product to us.

TURN AROUND TIME IN RESPECT OF PRODUCTS ACCEPTED BY RS UNDER THE REPAIR SERVICE IS ESTIMATED TO BE 20 WORKING DAYS FROM ACCEPTANCE BY RS BUT RS SHALL BE UNDER NO LIABILITY IF IT FAILS TO COMPLY WITH SUCH ESTIMATE. ALL ITEMS ADDED TO THE PRODUCT BY THE CUSTOMER MUST BE REMOVED FROM THE PRODUCT PRIOR TO RETURN TO RS UNDER EITHER SECTION A OR SECTION B BELOW. THE RETURN OF A PRODUCT TO RS UNDER EITHER SECTION SHALL BE DEEMED TO AUTHORISE RS TO REMOVE ANY SUCH ITEMS. RS SHALL NOT BE OBLIGED TO RECONNECT ANY SUCH ITEMS BEFORE RETURNING A PRODUCT. RS SHALL NOT BE UNDER ANY LIABILITY IN RESPECT OF ITEMS SENT WITH PRODUCTS TO RS.

YOU ARE ADVISED TO REFER TO THE PAGE OF THE CURRENT RS CATALOGUE ON WHICH THE PRODUCT IS FEATURED FOR ANY SPECIFIC INSTRUCTIONS IN THIS CONNECTION.

Section A : Claims under guarantee

(i) Original Purchase

This product is supplied subject to the Conditions of Sale contained in our current catalogue. The Guarantee therein shall not, however, apply to this product unless : -

(a) It is returned to RS by the original purchaser quoting the relevant **RS** invoice number.
(b) The questionnaire (overleaf) has been fully completed (including the symptoms of the fault) and is enclosed with the product.
(c) Any **RS** product serialisation label on the product has not been removed or made illegible.
(d) The product is defective, the defect not being the result of misuse, neglect, accident, improper installation or unauthorised repair and the product is free from any modifications other than such modifications as may be detailed in the literature supplied with the product.

(ii) Repair [Other than under Section A (i)]

This product is repaired subject to the Servicing Conditions contained in our current catalogue. The Guarantee contained therein shall not, however, apply to this product unless : -

(a) It is returned to RS by the customer who placed the order for the repair work in question.
(b) The questionnaire (overleaf) has been fully completed (including the symptoms of the fault) and is enclosed with the product.
(c) Any **RS** product serialisation label on the product has not been removed or made illegible.
(d) The repair work is defective, the defect not being the result of misuse, neglect, accident, improper installation or unauthorised repair and the product is free from any modifications other than such modifications as may be detailed in the literature supplied with the product.